

PHYTOLOGIA

An international journal to expedite botanical and phytoecological publication

Vol. 52

September 1982

No. 1

LIBRARY

SEP 30 1982

CONTENTS

NEW YORK

BOTANICAL GARDEN

- FOOTE, M. A., *The algae of New Jersey (U.S.A.) III. Pyrrophophyta (Dinoflagellates)* 1
- BROOKS, R. E., *New combinations in Delphinium and Rhus* 8
- D'ARCY, W. G., *Jaltomata werfii (Solanaceae), a new species from the Archipelago de Colon (Galapagos Islands)* ... 9
- BEETLE, A. A., *Noteworthy grasses from Mexico X* 11
- MOLDENKE, H. N., *Notes on new and noteworthy plants. CLX* 18
- MOLDENKE, H. N., *Additional notes on the genus Faradaya (Verbenaceae). I* 20
- MOLDENKE, H. N., *Additional notes on the genus Congea. III* .. 45
- SMITH, L. B., & READ, R. W., *Notes on Bromeliaceae, XLI* 49
- WURDACK, J. J., *Certamen Melastomataceis XXXV* 61
- MOLDENKE, A. L., *Book reviews* 70

Published by Harold N. Moldenke and Alma L. Moldenke

303 Parkside Road
Plainfield, New Jersey 07060
U.S.A.

Price of this number \$3.00; for this volume \$13.00 in advance or \$14.00 after close of the volume; \$5.00 extra to all foreign addresses and domestic dealers; 512 pages constitute a complete volume; claims for numbers lost in the mails must be made immediately after receipt of the next following number for free replacement; back volume prices apply if payment is received after a volume is closed.

The Algae of New Jersey (U.S.A.) III.
Pyrrhophyta (Dinoflagellates)

MaryAnn Foote
Ecology Program
Rutgers University
New Brunswick, New Jersey 08903

This is the third paper in a series detailing the occurrence and distribution of algae in the state of New Jersey.

Dinoflagellates are important primary producers of both fresh and salt waters. Most are oceanic plankton forms but freshwater species are often abundant in drainage ditches, pools or small lakes. Blooms of some marine species cause "red tides" and result in fish and animal kills.

Again the genera are listed alphabetically and collection dates chronologically within them. If no citation is given, the species was noted by the author.

I gratefully acknowledge the assistance of Ellen J. Vastola who prepared this document on the DEC-20 at Rutgers University.

PYRRHOPHYTA

DINOFLAGELLATES

- Amphidinium carterae Hulbert
Barnegat Bay (4,5,6); northern shore (7)
Amphidinium crassum Lohmann
northern shore (7)
Amphidinium fusiforme Martin
Barnegat Bay (4,5,6); northern shore (7); common in
Barnegat Bay (1,2); Little Egg Harbor, Barnegat
and Tuckerton Bay (9)
Amphidinium klebsii Kofoid & Swezy
northern shore (7)
Amphidinium operculatum Clap & Saehm
not common in shallow clear water, over a sandy bottom (1)
Amphidinium sphenoides Wulff
Barnegat Bay (4,5,6); northern shore (7)
Ceratium bucephalum Clive
rare (1,2); Barnegat Bay (4,5,6); northern shore (7)
Ceratium buceros Zacharias
northern shore (7)

- Ceratium furca (Ehrenberg) Dujardin
northern shore (7)
- Ceratium fusus (Ehrenberg) Clap & Saehm
well-known pelagic species brought into Barnegat Bay
by currents (1); Barnegat Bay (4,5,6); northern shore (7)
- Ceratium hirundinella (O.F.M.) Dujardin
Delaware-Raritan canal, May-Mar (8)
- Ceratium lineatum (Ehrenberg) Cleve
northern shore (7)
- Ceratium longipes (Bailey) Gran
northern shore (7)
- Ceratium macroceros (Ehrenberg) Letour
Barnegat Bay (4,5,6)
- Ceratium minutum Jorgensen
occasionally in Barnegat Bay (1); Barnegat Bay
(4,5,6); northern shore (7)
- Ceratium teres Kofoid
northern shore (7)
- Ceratium trichoceros (Ehrenberg) Kofoid
northern shore (7)
- Ceratium tripos Ehrenberg
fairly common at or near Barnegat Inlet (1);
Barnegat Bay (4); northern shore (7)
- Cochlodinium helix (Pouch) Temm & Lebour
Barnegat Bay, rare (1)
- Cystodinium bataviense Klebs
Helmetta (3)
- Dinophysis acuminata Claparide & Sachmann
Barnegat Bay and ocean, fairly common (1);
Barnegat Bay (4,5,6); northern shore (7)
- Dinophysis acuta Ehrenberg
Barnegat Bay (4,5,6); northern shore (7)
- Dinophysis acuminata Claparide & Sachmann
Little Egg Harbor, Barnegat and Tuckerton Bay (9)
- Dinophysis caudata Kent
Barnegat Inlet (1); northern shore (7)
- Dinophysis lackmanni Paulsen
northern shore (7)
- Dinophysis norvegica Claparide & Sachmann
northern shore (7)
- Dinophysis ovum Schutt
occasional, Barnegat Bay and ocean (1);
Barnegat Bay (4,6); northern shore (7)
- Dipolopsalis lenticula Bergh
Barnegat Bay, apparently not common (1); Barnegat Bay
(4,5,6)
- Exuviella apora Schiller
common in Barnegat and Delaware Bays and often found
in oyster stomachs (1); northern shore (7); Little
Egg Harbor, Barnegat and Tuckerton Bay (9)
- Exuviella baltica Lohmann
northern shore (7)

Exuviella compressa (Stein) Ostenfeld locally common in Barnegat Bay and often in oyster stomachs (1); Barnegat Bay, Sept-Dec (4); northern shore (7)

Exuviella lima (Ehrenberg) Butschli common in Barnegat Bay (1); Barnegat Bay, Sept-Dec (4); Barnegat Bay, Little Egg Harbor, Tuckerton Bay (9)

Exuviella mariae-lebouriae Park & Ballantine northern shore (7)

Exuviella marina Cienkowski northern shore (7)

Glenodinium brave Martin northern shore (7)

Glenodinium danicum Paulsen Barnegat Bay, very common frequently coloring tidal pools brown and often in oyster stomachs (1); Barnegat Bay (4,5,6); northern shore (7); Little Egg Harbor, Barnegat and Tuckerton Bay (9)

Glenodinium gymnodinium Penard Delaware-Raritan Canal, Jan-Apr (8)

Glenodinium kulczynski (Wolosz) Schiller Delaware-Raritan Canal, Oct (8)

Glenodinium lenticula (Bergh) Schiller northern shore (7)

Glenodinium marinum Massart northern shore (7)

Gonyaulax apiculata (Penard) Entz northern shore (7)

Gonyaulax diacantha (Meunier) Schiller northern shore (7)

Gonyaulax diegensis Kofoid northern shore (7)

Gonyaulax digitale (Pouchet) LeBour Barnegat Bay (5)

Gonyaulax longicornu Campbell northern shore (7)

Gonyaulax polyedra Stein northern shore (7)

Gonyaulax polygramma Stein Barnegat Bay (5)

Gonyaulax scrippsae Kofoid Barnegat Bay, common (1); Barnegat Bay (4,5,6); northern shore (7); Little Egg Harbor, Barnegat, Tuckerton Bay (9)

Gonyaulax spinifera (Clap & Saehm) Diesing Barnegat Bay, common (1); Barnegat Bay (4,5,6); northern shore (7); Little Egg Harbor, Barnegat, Tuckerton Bay (9)

Gonyaulax tricantha Jorgensen Barnegat Bay (5)

Gymnodinium amplinucleum Campbell northern shore (7)

Gymnodinium aureum Kofoid and Swezy northern shore (7)

- Gymnodinium danicans Campbell
northern shore (7)
- Gymnodinium galesianum Campbell
northern shore (7)
- Gymnodinium gracilentum Campbell
northern shore (7)
- Gymnodinium incolratum Conrad & Kufferath
Barnegat Bay (4,5,6); northern shore (7)
- Gymnodinium lazulum Hulbert
northern shore (7)
- Gymnodinium marinum Kent
northern shore (7)
- Gymnodinium nelsoni Martin
Barnegat Bay, not uncommon (1,2); Barnegat Bay (4,5,6);
northern shore (7)
- Gymnodinium punctatum Pouchet
Barnegat Bay, extremely abundant (1);
Barnegat Bay (4,5,6); northern shore (7)
- Gymnodinium roseostigma Campbell
northern shore (7)
- Gymnodinium simplex (Lohman) Kofoid & Swezy
northern shore (7)
- Gymnodinium splendens Lebour
most abundant large species in Barnegat Bay, occurring in
dense swarms Aug-Sept (1); Barnegat Bay (4,5,6); northern
shore (7); Little Egg Harbor, Barnegat and Tuckerton (9)
- Gymnodinium stellatum Hulbert
northern shore (7)
- Gymnodinium subroseum Campbell
northern shore (7)
- Gymnodinium subrufescens Martin
Barnegat Bay, abundant in certain brackish pools; Delaware
Bay, abundant causing patches of red water (1,2); northern
shore (7); Little Egg Harbor, Barnegat, Tuckerton Bay (9)
- Gymnodinium valdecompressum Campbell
northern shore (7)
- Gymnodinium verruculosum Campbell
northern shore (7)
- Gyrodinium aureolum Hulbert
northern shore (7)
- Gyrodinium dominans Hulbert
Barnegat Bay (4,5,6); northern shore (7)
- Gyrodinium estuariale Hulbert
northern shore (7)
- Gyrodinium falcatum Kofoid & Swezy
northern shore (7)
- Gyrodinium formosum Campbell
northern shore (7)
- Gyrodinium gloeculum Hulbert
northern shore (7)
- Gyrodinium metum Hulbert
northern shore (7)

- Gyrodinium pellucidum Wulff
extremely abundant, Barnegat Bay (1);
Barnegat Bay (4,5,6); northern shore (7)
- Gyrodinium pinque (Schutt) Kofoid & Swezy
Barnegat Bay, not uncommon (1);
Barnegat Bay (4,5,6); northern shore (7)
- Gyrodinium resplendens Hulbert
Barnegat Bay (4,5,6); northern shore (7)
- Gyrodinium spirale (Bergh) Kofoid & Swezy
northern shore (7)
- Gyrodinium uncatenum Hulbert
northern shore (7)
- Gyrodinium undulans Hulbert
northern shore (7)
- Heterocapsa triquetra (Ehrenberg) Stein
Barnegat Bay (4); northern shore (7)
- Katodinium asymmetricum (Massart) Loeblich III
northern shore (7)
- Katodinium rotundatum (Lohmann) Loeblich III
northern shore (7)
- Kryptoperidinium foliaceum (Stein) Lindemann
Barnegat Bay, not uncommon (1)
- Nematodinium armatum (Dogiel) Kofoid & Swezy
Barnegat Bay, abundant, Aug (1); Barnegat Bay (4,5,6)
- Noctiluca scintillans Macartney
Barnegat Bay (4,5,6)
- Oblea rotunda (Lebour) Balech
northern shore (7)
- Peridiniopsis rotunda Lebour
Barnegat Bay; extremely abundant in plankton and often
in oyster stomachs (1); Little Egg Harbor, Barnegat and
Tuckerton Bay (9)
- Peridinium achromaticum Levander
Tuckerton and Barnegat Bay, not rare (1)
- Peridinium breve Paulsen
northern shore (7)
- Peridinium brevipes Paulsen
Barnegat Bay, abundant in various parts (1); Barnegat Bay
(4,5,6); northern shore (7); Little Egg Harbor, Barnegat
and Tuckerton Bay (9)
- Peridinium claudicans Paulsen
Tuckerton Bay, common (1); Barnegat Bay (4,5,6); northern
shore (7); Little Egg Harbor, Barnegat, Tuckerton Bay (9)
- Peridinium concoides Paulsen
northern shore (7)
- Peridinium depressum Bailey
Barnegat Bay (4,5,6); northern shore (7)
- Peridinium divaricatum (Meunier) Parke
northern shore (7)
- Peridinium divergens Ehrenberg
northern shore (7)
- Peridinium excavatum Martin
Barnegat Bay, common (1,2); Barnegat Bay (4,5,6); northern

- shore (7); Little Egg Harbor, Barnegat, Tuckerton Bay (9)
Peridinium granii Ostensfeld
Barnegat Bay (4,5,6)
Peridinium leonis Pavillard
Barnegat Bay, common; Delaware Bay, abundant (1); Barnegat Bay (4,5,6); northern shore (7); Little Egg Harbor, Barnegat and Tuckerton Bay (9)
Peridinium pallidum Ostensfeld
Tuckerton Bay (1,); Barnegat Bay (4,5,6); northern shore (7)
Peridinium pellucidum (Bergh) Schutt
Barnegat Bay, rare (1)
Peridinium roseum Paulsen
Barnegat Bay (4,5,6)
Peridinium triquetra (Stein)
Barnegat Bay (4,5,6)
Peridinium trochoideum (Stein) Lemm
Barnegat Bay, extremely abundant (2); Barnegat Bay (4,5,6); northern shore (7); Little Egg Harbor, Barnegat and Tuckerton Bay (9)
Peridinopsis rotunda Lebour
Barnegat Bay (4,5,6)
Polykrikos barnegatensis Martin
Barnegat Bay, Sept (1); Barnegat Bay (4,5,6); northern shore (7)
Polykrikos kofoidii Chatton
Barnegat and Delaware Bay, abundant (1); Barnegat Bay (4,5,6); northern shore (7); Little Egg Harbor, Barnegat and Tuckerton Bay (9)
Prorocentrum micans Ehrenberg
extremely common in Barnegat Bay and in ocean waters; almost always found in oyster stomachs (1); Barnegat Bay (4,5,6); northern shore (7); Little Egg Harbor, Barnegat and Tuckerton Bay (9)
Prorocentrum minimum (Pavillard) Schiller
northern shore (7)
Prorocentrum redfieldi Bursa
Barnegat Bay (4,5,6); northern shore (7)
Prorocentrum scutellum Schroder
common in ocean waters and at times in Barnegat Bay (1); Barnegat Bay (4,5,6); northern shore (7)
Prorocentrum triangulatum Martin
extremely common in Barnegat Bay; occasionally the most abundant organism in oyster stomachs (1); Barnegat Bay (4,5,6); northern shore (7); Little Egg Harbor, Barnegat and Tuckerton Bay (9)
Protoceratium reticulatum (Clasp & Saehm) Bergh
Barnegat Bay (1)

References

1. Martin, G W. 1928. Dinoflagellates from marine and brackish waters of New Jersey. Iowa Studies Natl History 12:3-31
2. _____. 1929. Three new dinoflagellates from New Jersey. Bot. Gazette 50:556-8
3. Moul, E T and H F Buell. 1979. Algae of the Pine Barrens. IN: R T T Forman, editor. Pine Barrens: Ecosystem and Landscape. Academic Press, N Y 601pp
4. Mountford, K. 1967. The occurrence of Pyrrophyta in a brackish cove, Barnegat Bay, New Jersey at Mantoloking, May through December, 1966. Bull N J Acad Sci 12:9-12
5. _____. 1969. A seasonal plankton cycle in Barnegat Bay, New Jersey. M S Thesis. Rutgers University, New Brunswick, New Jersey
6. _____. 1971. Plankton studies in Barnegat Bay. PhD Dissertation. Rutgers University, New Brunswick, New Jersey
7. Olsen, P and M Cohn. 1979. Phytoplankton in lower New York Bay and adjacent New Jersey estuarine and coastal waters. Bull N J Acad Sci 24:59-69
8. Renlund, R W. 1953. A study of the net plankton of the Delaware and Raritan Canal. PhD Dissertation. Rutgers University, New Brunswick, New Jersey
9. Sugihara, T and C. Yearsley, J B Durand and N P Psuty. 1979. Comparison of Natural and Altered Estuarine Systems: Analysis. Center for Coastal and Environmental Studies. Rutgers University, New Brunswick, New Jersey 247pp

NEW COMBINATIONS IN DELPHINIUM AND RHUS

Ralph E. Brooks

University of Kansas Herbarium, Lawrence, KS 66044

Recent herbarium and particularly field studies indicate that two nomenclatural changes not previously made are in order. These are made herein so that they are available for use in several forthcoming publications.

Delphinium carolinianum Walt. subsp. virescens R. E. Brooks, comb. nov. Basionym: D. virescens Nutt., Gen. N. Amer. Pl. 2: 14. 1818.

Warnock (1981) treated virescens as a synonym of D. carolinianum subsp. pernardii (Huth) Warnock. Field examinations of numerous individuals combined with morphological evaluations, including SEM studies of the seeds, indicate that virescens is sufficiently distinct from pernardii to warrant taxonomic recognition of virescens. Warnock's (op. cit.) concept of subspecies in this group is new, however, and one with which I agree. Subsp. virescens has mostly equally distributed cauline leaves with few basal leaves and the upper stem and rachis are covered with basally yellow, pustulate trichomes. It occurs in the eastern Great Plains and adjacent eastern areas from North Dakota south to northeast Texas and Missouri. Subsp. pernardii usually has a distinct basal rosette of leaves with few cauline leaves, the upper stem is canescent and sparsely pustulate hairy, and the rachis is canescent. The subspecies occurs in the western Great Plains from western Nebraska south to Texas.

Rhus aromatica Ait. subsp. flabelliformis (Shinners) R. E. Brooks, comb. nov. Basionym: Rhus aromatica var. flabelliformis Shinners, Field & Lab. 19: 86. 1951.

Rhus aromatica Ait. subsp. serotina (Greene) R. E. Brooks, comb. nov. Basionym: Schmalitzia serotina Greene, Leaflet. Bot. Observ. Crit. 1: 131. 1905.

Weber et al. (1981) published the combination Rhus aromatica subsp. pilosissima (Engelm.) W. A. Weber but did not make new combinations for the above phases of R. aromatica occurring in the Great Plains.

LITERATURE CITED

- Warnock, M. J. 1981. Biosystematics of the Delphinium carolinianum complex. Syst. Bot. 6: 38-54.
- Weber, W. A., B. C. Johnston and R. Wittman. 1981. Additions to the flora of Colorado - VII. Brittonia 33: 325-331.

JALTOMATA WERFII (SOLANACEAE), A NEW SPECIES FROM THE
ARCHIPELAGO DE COLON (GALAPAGOS ISLANDS).

W. G. D'ARCY

MISSOURI BOTANICAL GARDEN

Jaltomata werfii D'Arcy spec. nov.¹ TYPE: Isabela (Albemarle)
Island, van der Werff 1503 (MO, isotypes reportedly at CAS and
U, neither seen.

Herb to ?1 m tall, stems angular, glabrescent, emergent parts
with long, weak, perhaps viscous hairs. Leaves tardily
glabrescent, on emerging with scattered, weak, white multi-
cellular simple hairs, ovate, mostly 6-9 cm long, 5-7 cm wide,
apically short acuminate, basally deltoid to subtruncate,
sometimes somewhat oblique or dimidiate, the margins shallowly
and somewhat irregularly sinuately lobed, the lobes (teeth)
broadly acuminate, the sinuses rounded; petioles glabrescent,
1/3 to 1/2 as long as the leaf, minutely winged in the apical
portion, inserted in pairs at the nodes of branches.
Inflorescences 3-4 flowered axillary umbels; peduncle slender,
ca. 1 cm long; pedicels ca. 5 mm long, hirsute with long, weak
multicellular hairs. Flowers with the calyx ca. 1 cm across
(in juvenile fruit), the lobes rounded-acute, apiculate, the
sinuses deltoid, the costa prominent, the lobes short pub-
escent within, the limb glabrate, the calyx copiously pub-
escent outside; corolla white, rotate, ca. 2 cm across, del-
toid lobed, apparently slightly constricted just above the
ovary, the lobes and the rim of the ovary constriction
ciliate; stamens with the filaments unequal, 2 & 4 mm long
in the same flower, glabrous above, ciliolate basally, the
anthers ca. 1 mm long.

This species differs from Jaltomata procumbens (Cav.) J. L.
Gentry, the widespread species on the American mainland,
in its copiously pubescent young parts, its white flowers,
orange fruit, and in its unequal stamens. It also tends to
have more conspicuously lobed leaves.

Jaltomata has now been collected from three islands in the
Galapagos group, and the variability present is striking.
The above description, taken from the type specimen, is of a
glabrate plant with small flowers and calyces. One collection

¹ Jaltomata werfii, herba erecta v. repens. Differt Jaltomatis
alteris foliis pubescentibus, corolla alba, ciliata, fructu
aurantiaco.

by the Aderssens (940) is a plant copiously pubescent in all parts with calyces ca 2 cm across, very different on overall appearance, and another of their collections (540) is intermediate between the type collection and their collection 940. The genus Jaltomata, which has never been revised, has a wide range of morphology, and for convenience, only one species, J. procumbens, is usually recognized on the mainland, although there would seem to be a number of species actually present. It is therefore expedient to recognize only one species for the Galapagos at this time.

The type collection was made by Henk van der Werff, now at the Missouri Botanical Garden, while on an ecological study of the islands. By letter he reports: "Jaltomata occurs on the upper windward (therefore wet) slopes of Alcedo and Santa Cruz. I found it mostly in two habitats. One is along tree fern thickets (Cyathea weatherbyana); such thickets are rare, but Jaltomata was always present. The second habitat is in steep lava holes near the summit of Santa Cruz. The prevailing vegetation in the summit area is evergreen herbaceous--Fern Sedge zone in Wiggins & Porter's Flora (1971)--but inside these holes a low evergreen vegetation is present. These small forest stands are somewhat different from the vegetation types described by Wiggins & Porter. Presence and abundance of tall ferns (Cyathea, Dennstaedtia, Diplazium and Tectaria) suggest that these forest patches are closely related to the Miconia scrub."

COLLECTIONS SEEN:

FERNANDINA (NARBOROUGH): Uncommon, branched herb, height 50 cm. white flowers, SW part of main caldera rim, small densely vegetated vally, 1350 m, Aderssen & Aderssen 540 (C). Here and there, subshrub, white flowers, accrescent calyx, fruit a globose dark berry, S rim, mixed dry highland forest on S facing slope, 1400 m. Aderssen & Aderssen 940 (2 sheets, C). ISABELA (ALBEMARLE): Corolla white, pubescent; stem thick, juicy at base, slightly creeping and ascending, leaves and calyx pubescent, edge of tree fern thicket, volcano Alcedo, 1020 ft, van der Werff 1503 (MO). SANTA CRUZ (INDEFATIGABLE): Flower white, fruits orange, not common, in sheltered areas near top of main peak, 2075 ft, Bowman 79 (UC). Corolla white, margin of corolla pubescent; stem angular, hollow, slightly creeping and suffrutescent at base, in deep shade in lave hole with dense vegetation, near summit of island, 2200 ft, van der Werff 1352 (MO).

Wiggins, I. L. & D. M. Porter. 1971 Flora of the Galapagos Islands. Stanford Univ. Press.

NOTEWORTHY GRASSES FROM MEXICO X

Alan A. Beetle APDO Postal 284
Hermosillo, Sonora, Mexico

These are results from continuing studies sponsored by the Comision Tecnico Consultiva para la Determinacion Regional de los Coeficientes de Agostadero, fundada en 1966, under the Secretaría de Agricultura y recursos Hidraulicos.

For previous papers see Phytologia 27:1974; 28:1974; 30:1975; 35:1977; 38:1978; 47:1981; and 49:33-43. 1981.

Agrostis hiemalis (Walt.) BSP var. laxiflora (Gray) comb. nov.

Agrostis scabra Willd. Sp. Pl. 1:370. 1797.

Agrostis michauxii var. laxiflora A. Gray, N. Amer. Gram. & Cyp. 1:17. 1834.

Trichodium laxiflora (Michx.) Richards, Bot. App. Franklin Jour. 731. 1823.

Although Hitchcock's Manual does not indicate a southern distribution into Mexico for either A. hiemalis or A. scabra they have both been reported. After an examination of many collections the conclusion is reached that only A. scabra occurs in Mexico and that it is better treated as a variety of A. hiemalis.

Andropogon semigladium (Nash) comb. nov.

Schizachyrium semigladium Nash, N. Amer. Fl. 17:103. 1912

Described from Sierra Madre, near Colonia Garcia, Chihuahua, Mexico.

Type: C. H. Townsend and C. M. Barbar 335.

Bouteloua gracilis (HBK) Lag. ex Steud. var. major (Vasey)

Bouteloua oligostachya (Nutt.) Torr. ex A. Gray var. major Vasey ex L.H. Dewey, Contr. U.S. Nat. Herb. 2:531. 1894.

Type, Lemmon 427 (a cultivated plant); type locality Mexico

B. gracilis var. major has racemes which are 6 to 7 cm long. In B. gracilis var. gracilis relatively large racemes are only 4 cm long. B. gracilis var. major has been collected in the Mexican states of Aguascalientes, Jalisco, Guanajuato, and Hidalgo.

Bouteloua hirsuta var. palmeri Vasey in Beal, Grasses N. Amer. 2:417. 1896.

Erucaria glandulosa Cerv., Naturaleza 1:347. 1870.

Bouteloua hirticulmis Scribn. U.S. Dept. Agr., Div. Agrost. Circ. 30:4. 1901.

Bouteloua bolanderi Vasey ex Beal. Grasses N. Amer. 2:417. 1896, nomen.

Bouteloua glandulosa (Cerv.) Swallen, N. Amer. Fl. 17: 621. 1939.

Bouteloua hirsuta, Lag. var. glandulosa (Cerv.) Gould, Jour. Arnold Arbor. 60:320. 1979.

Swallen in making the new combination states "Perennial; very similar in habit and appearance to B. hirsuta, differing mostly in its conspicuously papillose-hirsute culms; awns of the rudiment somewhat longer than in B. hirsuta, the spikes therefore more bristly."

According to Gould "The occurrence of forms of B. hirsuta with sparsely hirsute culms in the Santa Rita Mountains supports Griffiths' observations that B. glandulosa is probably only a form of B. hirsuta and not distinct."

B. hirsuta var. palmeri Vasey is described by Vasey as "much larger, often a meter high; spikes 3-6 in number, broader, often 4 mm long." (Note: this seems to be a mistake for 4 cm long).

If Bouteloua glandulosa is to be treated as a variety of Bouteloua hirsuta then B. hirsuta var. palmeri Vasey is the earliest name.

Brachiaria arizonica (Scribn. & Merr.) Blake var. major (Vasey) comb. nov.

Panicum fuscum Swartz var. majus Vasey, U.S. Dept. Agr. Div. Agrost. Circ. 32:3. 1901.

Panicum fasciculatum var. major (Vasey) Beal, Grasses North America 2:117. 1896

Brachiaria arizonica (Scribn. & Merr.) Blake var. laeviglume
(Scribn. & Merr.) comb. nov.

Panicum arizonicum var. laeviglume Scribn. & Merr.
U.S. Dept. Agr. Div. Agrost. Circ. 32:3. 1901.
Described from "Mescal, Arizona".

Brachiaria arizonicum (Scribn. & Merr.) Blake var. tenue
(Scribn. & Merr.) comb. nov.

Panicum arizonicum var. tenue Scribn. & Merr. U.S.
Dept. Agr. Div. Agrost. Circ. 32:3. 1901.

Brachiaria fasciculata (Swartz) Parodi var. reticulata
(Torr.) comb. nov.

Panicum fasciculatum var. reticulatum (Torr.) Beal,
Grasses N. Amer. 2:117. 1896.

Panicum reticulatum Torr. in Marcy, Expl. Red River.
299. 1852. Described from Red River, Texas.

Panicum fuscum Sw. reticulatum (Torr.) Scribn. and
Merr. U.S. Dept. Agr. Div. Agrost. Circ. 32:4.
1901.

Brachiaria fasciculata (Swartz) Parodi var. stricta
(Doell in Mart.) comb. nov.

Panicum fasciculatum Sw. var. strictum Doell in
Mart. Fl. Bras. 2 (2):205. 1877.

Brachiaria fasciculatum (Swartz) Parodi var. carthaginense
(Sw.) comb. nov.

Panicum fasciculatum Sw. var. carthaginense (Sw.)
Doell. in Mart. Fl. Bras. 2 (2):205. 1877.

Panicum carthaginense Sw. Prod. Veg. Ind. Occ.
22:1788.

Digitaria nutans (L.) comb. nov.

Andropogon nutans L. Sp. Pl. 1045. 1753, pro parte,
excl. syn. Gronov. virg. 133.

Andropogon insulare L., Syst. Nat. ed. 10. 2:1304.
1759 (May or June), quoad. syn. Sloan.

Andropogon insulare L., Pugillus Pl. Jam. 1759 (Nov.),
quoad. specimen Brownianum.

Trichanchne insularis (L.) Nees, Agrost. Bras. 86.
1829.

Koeleria californica (Domin) comb. nov.

Koeleria pseudocristata Domin var. californica Domin,
Magyar Bot Lapok 3:264. 1904.

Type C.G. Pringle. Collected in 1882 "hills, San Diego", type collection seen in U.S. Nat. An elegant large-flowered, long paniced species from California and northern Mexico.

Koeleria cristata (L.) Pers. var. elegantula (Domin) comb.
nov.

This small-flowered type is a good geographical variety. Type collection, C.F. Baker 576 from Gunnison Colorado, seen in the U.S. Nat. Herb. The United States Forest Service herbarium now at Laramie, Wyoming has an excellent series of collections of this variety.

Leptochloa digitatiformis sp. nov.

Perenne, affine L. chloridiformi; culmi erecti. caespitosi, 60-150 cm alti, laminae hasta 3 mm latae; vaginae glabrae; ligula membranaceo con cilia ca. 1 mm longa. Racemis 5-10, conjugatis, 10-16 cm longis; spiculae non imbricatae; glumae 1-nervata, acuminata, 1.5-3 mm longa, inaequalae; spiculis 1-floris, brevipedicellatis; lemmata ca 3 mm longa, pilis marginalis, sine arista, incise.

Type: Mexico, Sonora, Ejido km 47, mpio Fronteras, matorral subinermis, August 19, 1981, Coll. Raul Bernal and Rene Cuadra. Also collected in Sonora, between Cananea and Agua Prieta, August 15, 1980, by Sergio Luque.

Stout, caespitose perennial with stiffly erect culms mostly 60 to 150 cm tall; sheaths smooth, compressed, purplish; ligule ca 1 mm long, a dense, irregular fringe of white hairs on a minute membranous base; blades firm, scabrous, elongate, up to 3 mm broad, usually somewhat narrower than the rather prominent sheaths.

Inflorescence partially included in the uppermost sheath, with 5 to 10 flexuous branches clustered or sub-digitate at the culm apex; inflorescence branches mostly 10 to 16 cm long and about 3 mm wide, the 2-flowered spikelets short-pedicelate and not overlapping; glumes 1-nerved, acute, 1.5 to 3 mm long, the first glume shorter than the second; lemmas with a very few scanty cilia on the margins, notched awnless and ca. 3 mm long.

Apparently related to the Argentine Leptochloa chloridiformis (Hack.) Parodi but differing in the remote spikelets (not imbricate) and the notched apex of the lemma (not three toothed). This is the only Mexican species with digitate racemes. It is not clear from the description in Gould's Grasses of Texas (1975) whether his report of Leptochloa chloridiformis is actually that species or is L. digitatiformis.

Panicum fernandopoanum nom. nov.

Panicum macrophyllum Guinea ex Clayton, Kew Bull.
21 (1) 111. 1967.

Not P. macrophyllum Raddi (1823) which is Panicum latissimum Mikan; cf. Chase, A. 1923. The identification of Raddi's Grasses. Jour. Wash. Acad. Sci. 13:178.

Paspalum humboldtianum Flugge var. elegantissima
var. nov.

Perenne, affine P. humboldtianum var. humboldtianum, culmi hasta 1 m alti, laminae 1.5-1.8 cm latae, angustissima, con medium maximum partem, planae; area de torques cum pelos densa, longa y declinatio recta. Panicula de tres (o cinco) racemi 7-11 cm longi; spiculae 4 mm longae, biseriatis, sessilibus, oblongis, sericeo-villosis, saepe purpuris.

Perennial, rhizomatous, forming very loose clumps, the culms 6 to 8 dm tall, the joints yellowish, smooth, torn sheath bases at the nodes, the lower sheaths bladeless, the upper sheaths with blades more or less divaricately spreading, 1 to 1.5 dm long, 1 to 1.5 cm broad, tapering on both ends, leaf margins commonly ciliate, the color area usually densely clothed with long, divaricately spreading hairs. Inflorescence of at least two and occasionally 5 racemes but mostly 3 or 4, 5 to 8 cm long, 1 to 2 cm apart; spikelets rarely only 2 mm. long, mostly 3 to 3.5 mm long, the cilia an off-color white, the sterile lemma usually with a purplish edge, the white cilia contrasting sharply with the dark purple stigmas.

Type Collection:

Beetle M - 5962 from Mexico, Jalisco, 9 km from Los Volcanos San Jose de Las Andrade, Sept. 29, 1980.

Distribution:

Common from 500 to 2000 m in Mexico, pine or oak woods. Mexican collections include Oaxaca; Conzatti 3641; Guerrero: Hinton 11400; Morelos: Hitchcock 6837; Michoacan: Leavenworth 1649; Colima: Hitchcock 7055 Jalisco:McVaugn 19098.

Paspalum humboldtianum var. stuckertii (Hack.) Hack. Allg. Bot. Zeitsch. 12:97. 1906. is a plant with very narrow and elongate leaves but somewhat similar purplish-edged spikelets and white hairs, that is found in Argentina. Paspalum humboldtianum var. humboldtianum which is common in Mexico and Central America has spikelets with brownish hairs arranged on shorter racemes.

Paspalum guzmanii nom. nov.

Paspalum indutum Swallen, Phytologia 14:373. 1967.
not P. indutum Lucas, Jour. Washington Acad.
Sci. 32:162. f. 6. 1942.

Raphael Guzman-M. has maintained a steady interest in the genus Paspalum and has prepared the text on Paspalum for a forthcoming "Grasses of Mexico".

Poa coahuilensis nom. nov.

Poa filiculmis Swallen, Contr. U.S. Nat. Herb. 29:400.
1950, from Coahuila, Mexico, Stanford, Retherford
and Northcraft no. 477.

Not Poa filiculmis Roshev Not. Syst. Herb. Inst. Bot.
Komarov Acad. Sci. U.R.S.S. 11:28. 1949.

Sorghastrum albescens (Fourn.) comb. nov.

Andropogon albescens Fourn. Mex. Pl. 2:56. 1886.
Based on Gouin 53 from Veracruz, Mexico.

Sorghastrum liebmannianum Hitchcock, Contrib. U.S.
Nat. Herb. 17:211. 1913. Based on Hitchcock
6352 from Veracruz, Mexico.

NOTES ON NEW AND NOTEWORTHY PLANTS. CLX

Harold N. Moldenke

ALOYSIA BECKII Mold., sp. nov.

Frutex humilis, ramis obtuse tetragonis atrogriseis subglabratiss longitudinaliter pauca striatis ramosissimis, ramulis abbreviatis numerosis gracilibus rigidulis minutissime (sub tente) puberulis vel glabrescentibus, foliis parvissimis sessilibus vel subsessilibus spathulatis ca. 6 mm. longis 1.5 mm. latis apicaliter rotundatis marginaliter integris basaliter longe attenuatis ubique minutissime puberulis, inflorescentiis axillaribus paucis brevissimis ca. 1.5 cm. longis dense multifloris, pedunculis gracillimis ca. 4 mm. longis minutissime puberulis.

A low shrub, to 1.2 m. tall, much-branched; stems and branches slender, stiff, dark-gray, obtusely tetragonal, subglabrate, striate with elevated longitudinal ridges on the margins; branchlets and twigs numerous, very slender, stiff, obtusely tetragonal and striate-margined (the ridges apparently eventually becoming self-detaching), under a hand-lens very minutely puberulent or subglabrescent; leaves very small, decussate-opposite but usually crowded on much abbreviated spurs, sessile or subsessile, spatulate, to about 6 mm. long and 1.5 mm. wide, apically rounded, marginally entire, basally long-attenuate, very minutely puberulent (under a hand-lens) on both surfaces; inflorescence axillary, spicate, much abbreviated, sparse, about 1.5 cm. long (in all), densely many-flowered; peduncles filiform, about 4 mm. long, very minutely puberulent; calyx very small, densely hirsute, about 1 mm. long (in all), the rim long-toothed; corolla very small, hypocrateriform, about 3 mm. long in all, white.

The type of this curious little species was collected by Dr. Stephan G. Beck (no. 7036) -- in whose honor it is named -- on rocky hillsides with *Schinopsis* and *Aspidosperma*, at 2370 m. altitude, 185 km. from Santa Cruz, in Carrasco province, Cochabamba, Bolivia, on September 27, 1981, and is deposited in the Lundell Herbarium at the University of Texas.

LANTANA MACROPODA f. *PARVULA* Mold., f. nov.

Haec forma a forma typica speciei ubique parvula recedit foliis maturis 1--2 cm. longis 5--10 mm. latis pedunculis abbreviatis 2--3 cm. longis.

This form differs from the typical form of the species in being smaller in all its parts, the mature leaves only 1--2 cm. long (in all) and 5--10 mm. wide, the peduncles only 2--3 cm. long, and the flowering and fruiting heads smaller.

The type of this form was collected by A. Andreasen, R. L. Oliver, and S. Verhoek-Williams (no. 657) at 4000 feet altitude on Highway 15 from Guadalajara to Tepic at km. 94 after Magdalena on July 12, 1971, and is deposited in the Lundell Herbarium at the University of Texas.

LIPPIA INTEGRIFOLIA var. *BECKII* Mold., var. nov.

Haec varietas a forma typica speciei foliis regulariter 1 cm. longis oblanceolatis ca. 1 mm. latis marginaliter revolutis et pedunculis usque ad 5 mm. longis capitulis parvioribus recedit.

This variety differs from the typical form of the species in its mature leaves being quite uniformly only about 1 cm. long and 1 mm. wide, oblanceolate, and marginally revolute, the peduncles only to 5 mm. long, and the flowering and fruiting heads smaller.

The type of the form was collected by Stephan G. Beck (no. 7433) in matorral with small shrubs, at 2830 m. altitude, 130 km. from Independencia, in Ayopaya province, Cochabamba, Bolivia, on November 28, 1981, and is deposited in the Lundell Herbarium at the University of Texas.

PAEPALANTHUS CONVEXUS var. *PARVICEPHALUS* Mold., var. nov.

Haec varietas a forma typica speciei foliis regulariter 1.5 cm. longis et capitulis 7--10 mm. latis recedit.

This variety differs from the typical form of the species in having its very closely congested stem leaves uniformly 1.5 cm. long and the flowering and fruiting heads only 7--10 mm. wide.

The variety is based on Steyermark, Guariglia, Holmgren, Luteyn, & Mori 126100 from "Cumbre altiplanicie de rocas expuestas, escabrosa, río abajo", at 2330--2460 m. altitude, lat. 3° 35' N., long. 65°20' W., Cerro Marahuaca-Fhuif, dept. Atabapo, Amazonas, Venezuela, on February 3 or 4, 1982, and is deposited in the Lundell Herbarium at the University of Texas.

SYNGONANTHUS FERTILIS var. *HIRTELLUS* Mold., var. nov.

Haec varietas a forma typica speciei caulibus foliisque vaginisque pedunculisque dense hirtellis recedit.

This variety differs from the typical form of the species in having its leaves, stems, sheaths, and peduncles densely hirtellous, the hairs on the stems and leaves shorter and often subappressed, those on the peduncles wide-spreading and brownish.

The variety is based on Calderón, Monteiro, & Guedes 2748 from wet depressions in a savanna region at Estrada do Estanho on the road to Igarapé Preto about 60 km. southeast of the Transamazón Highway, Amazonas, Brazil, collected on July 2, 1979, and deposited in the Lundell Herbarium at the University of Texas.

VITEX CYMOSA f. *ALBIFLORA* Mold., f. nov.

Haec forma a forma typica speciei corollis albis recedit.

This form differs from the typical form of the species in its white corollas.

The type of the form was collected by Dr. Stephan G. Beck (no. 7136) on the banks of the Río Piray, Jardín Botánico Municipal, at Santa Cruz, at about 650 m. altitude, in A. Ibañez province, Santa Cruz, Bolivia, on October 2, 1981, and is deposited in the Lundell Herbarium at the University of Texas. The park is a remnant of the natural vegetation of the area, without introduced plantings. The tree was 8 m. tall, corolla zygomorphic.

ADDITIONAL NOTES ON THE GENUS *FARADAYA* (VERBENACEAE). I

Harold N. Moldenke

FARADAYA F. Muell.

Additional & emended bibliography: Pynaert, Bull. Agric. Cong. Belg. 11: 213, fig. 43. 1920; Mold., Phytologia 51: 384--400. 1982.

FARADAYA LEHUNTEI (Horne) A. C. Sm.

Additional bibliography: Mold., Phytologia 51: 399--400. 1982.

Collectors describe this species as "twisting around and over the branches of rainforest trees" (Bryan 284), to 6 m. tall, the stems to 15 cm. in diameter at breast height, or a woody vine or liana; bark moderately rough, gray-brown or mottled gray-brown and olive; sapwood soft, brown; heartwood soft, yellow-brown, pithy; pith brown; flower-buds greenish-white; flowers fragrant; calyx 4-lobed; corolla white; filaments and style white; fruit small, round, at first green, later reddish, orange or orange-red when mature, in fours, "pickle-like"..

They have encountered it in dense forests, the edges of forests, dense bush and thickets, often on hills, at 100--970 m. altitude, in anthesis in February, April, and May, and in fruit in April (young), June, August, and October.

Faradaya neo-ebudica is based on *Kajewski* 813 from the rainforest at Anelgauhat Bay, at 120 m. altitude, on Aneityum island in the New Hebrides, collected on February "29, 1929" [a non-existent date; probably March 1], and is described as being a "common white-flowered vine growing to the tops of rainforest trees".

Vernacular names reported for *F. lehuntei* are "ngakawa", "wa korovundi", "wakorovundi", and "wa vatu".

Guillaumin (1932) comments that "I believe that on account of the calyx and ovary, notwithstanding the fact that the scarcely exerted stamens are inserted at the middle and not at the mouth of the corolla-tube, this species should be referred to the genus *Faradaya* of New Guinea which extends to the Samoa Islands, Queensland and Borneo, but does not seem to occur in the Moluccas and in Malaysia."

The variety *puberulenta* is based on A. C. Smith 5799 from the edge of a forest, at 870--970 m. altitude, between Mount Tomanivi and Nesonggora, on the northern portion of the Raivainatuku Plateau, Naitasiri, Viti Levu, collected between August 21 and September 18, 1947, and deposited in the Britton Herbarium at the New York Botanical Garden.

Material of *Faradaya lehuntei* has been misidentified and distributed in some herbaria as *F. amicorum* (Seem.) Seem., *F. ovalifolia* (A. Gray) Seem., *F. vitiensis* Seem., *Clerodendron amicorum* Seem., and even *C. cubense* Schau.

Citations: NEW HEBRIDES: Aneityum: *Kajewski* 813 (Bi, Bz--21011, La, N). FIJI ISLANDS: Kandavu: *A. C. Smith* 81 (Bi, Ca--602219, N, S, W--1672847). Matuku: *E. H. Bryan* 284 [wood sample 64] (Bi). Moala: *E. H. Bryan* 341 [wood sample 92] (Bi). Ngau: *A. C. Smith* 7764 (Hk). Ovalau: *A. C. Smith* 7388 (Hk). Tailevu: *A. C. Smith* 7032 (N). Taveun: *A. C. Smith* 8385 (Hk). Vanua Levu: *A. C. Smith* 1570 (Bi, N, W--1672723), 1845 (Bi, N, W--1676400). Viti Levu: *O. Degener* 16743 [14743] (N, N); *J. W. Gillespie* 2670 (Bi); *MacDaniels* 1052 (Bi); *A. C. Smith* 5799 (Bi, Bi, N), 7016 (Hk), 7032 (Id), 8746 (W--2191396). TONGAN ISLANDS: Eua: *H. E. Parks* 16137 (Ca--297273, N), 16216 (Bi, Ca--297094). CULTIVATED: Java: *Herb. Tjibodas* P.2 (Bz--26490).

FARADAYA LEHUNTEI var. *DEGENERI* (Mold.) Mold., comb. nov.

Synonymy: *Faradaya neo-ebudica* var. *degeneri* Mold., *Phytologia* 4: 53. 1952.

Bibliography: Mold., *Phytologia* 4: 53. 1952; Mold., *Résumé* 206 & 455; Mold., *Fifth Summ.* 1: 343 (1971) and 2: 878. 1971; Mold., *Phytol. Mem.* 2: 333 & 547. 1980.

This variety differs from the typical form of the species in having its peduncles, inflorescence-branches, pedicels, and calyx completely glabrous and its leaf-blades more regularly narrow-elliptic.

The variety is based on *Degener & Ordenez* 13762 from a forest, at 30--80 m. altitude, at the Suva Pumping Station, in Naitasiri province, Viti Levu, Fiji Islands, collected (in flower) on December 15, 1940, and deposited in the Britton Herbarium at the New York Botanical Garden. Thus far it is known only from the original collection. It was originally distributed as *F. vitiensis* Seem.

Citations: FIJI ISLANDS: Viti Levu: *Degener & Ordenez* 13762 (A--isotype, N--type, N--isotype).

FARADAYA MAGNILOBA Wernham in Ridl., *Trans. Linn. Soc. Lond. Bot.* 9: 136. 1916.

Bibliography: Wernham in Ridl., *Trans. Linn. Soc. Lond. Bot.* 9: 136. 1916; H. J. Lam, *Verbenac. Malay. Arch.* 228--230 & 365. 1919; H. J. Lam in Lam & Bakh., *Bull. Jard. Bot. Buitenz.*, ser. 3, 3: 71. 1921; Fedde & Schust., *Justs Bot. Jahresber.* 44: 254. 1922; A. W. Hill, *Ind. Kew. Suppl.* 6: 85. 1926; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 1, 67 & 92 (1942) and ed. 2, 149 & 185. 1949; Mold., *Résumé* 201 & 455. 1959; Mold., *Fifth Summ.* 1: 336 (1971) and 2: 878. 1971; Mold., *Phytol. Mem.* 2: 326 & 547. 1980.

A glabrous climbing shrub; branchlets terete, striate, glabrous; leaves decussate-opposite; petioles 3--4 cm. long, often twisted; leaf-blades firmly chartaceous, elliptic, about 18 cm. long, 8 cm. wide, apically very shortly and acutely acuminate, basally obtuse, marginally entire; secondaries about 6 pairs, prominent beneath; flowers large; calyx 2-parted almost to the base, the lobes 2--5 cm. long, scaphiform, apically very acutely acuminate; corolla white, glabrous, its tube cylindric, antrorsely infundibular, 3.5--4 cm. long, basally narrowed, the lobes very large, oblong, 5 cm.

long, each bifid to the middle; filaments very long-exserted, 14. or more cm. in length, basally swollen and hairy, otherwise glabrous; anthers 4--5 mm. long, the thecae basally free; ovary minute, externally sparsely yellow-hairy; fruit subpyriform.

This species is based on an unnumbered Klass [Wollaston Expedition] collection from Camps I to III, at 2000--2500 feet altitude, in West Irian. Thus far it is known only from the original collection. Lam (1919) erroneously dates the original publication as "1906". Ridley (1916) notes that the species is "Distinct in the large flowers and bilobed corolla-segments".

FARADAYA MATTHEWSII Merr., Journ. Roy. Asiat. Soc. Straits Br. 76: 115--116. 1917.

Bibliography: E. D. Merr., Journ. Roy. Asiat. Soc. Straits Br. 76: 115--116. 1917; H. J. Lam in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 71. 1921; E. D. Merr., Bibl. Enum. Born. Pl. 515. 1921; A. W. Hill, Ind. Kew. Suppl. 6: 85. 1926; Fedde & Schust., Justs Bot. Jahresber. 47 (2): 245. 1927; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 65 & 92 (1942) and ed. 2, 145 & 185. 1949; Mold., Résumé Suppl. 3: 24. 1962; Mold., Fifth Summ. 1: 324 (1971) and 2: 878. 1971; Mold., Phytol. Mem. 2: 315 & 547. 1980.

A scandent shrub; stems to about 2.5 cm. in diameter, glabrous; branches terete, subolivaceous, about 5 mm. in diameter, smooth, glabrous; leaves decussate-opposite; petioles 3.5--5 cm. long, glabrous; leaf-blades chartaceous to subcoriaceous, ovate to oblong-ovate, to 22 cm. long and 12 cm. wide, olivaceous and shiny on both surfaces or medium-green and glossy above, pale-green and dull beneath, apically conspicuously acuminate (the acumen itself stout and blunt), marginally entire, basally broadly rounded or rarely subcordate, glabrous on both surfaces, the lower surface with 2 or 3 prominent, brownish, discoid glands on each side of the midrib; secondaries 5 or 6, prominent beneath, curvate, anastomosing; veinlet reticulation loose, prominent beneath; inflorescence terminal, cymose, about 15 cm. long, somewhat puberulent, sometimes with a pair of greatly reduced leaves; bracts linear or filiform, about 5 mm. long; bracteoles minute; pedicels to 1 cm. long, very densely hirsutulous; flowers tetramerous, to 6.5 cm. long overall; calyx closed in bud, lanceolate, 2--2.5 cm. long, inflated, apically rostrate-acuminate, externally very slightly puberulent to very densely hirsutulous and with a few, large, scattered, brown, discoid glands, during anthesis split nearly to the base into 2 lanceolate, valvate, apically acuminate lobes, each up to 8 mm. wide; corolla white, narrowly infundibular, yellow in the throat, its tube about 4 cm. long, basally 3 mm. in diameter, somewhat ampliate for the upper 1 cm., the lobes 4, imbricate, obovate, 1.5--2 cm. long, to 2.5 cm. wide, apically broadly rounded, basally narrowed; stamens 4, equal or subequal, inserted about 2 cm. above the base of the corolla-tube; filaments 3.5 cm. long, somewhat exserted, basally hirsute, apically glabrous; anthers oblong, 4 mm. long, versatile; style filiform, 6.5 cm. long; stigma-lobes 2, short; ovary ovoid, 3 mm. wide, externally somewhat

cinereous-pubescent with short stiff hairs, at first 8-lobed, later 4-lobed, 1-celled, with 2 parietal placentae, each placenta bearing 2 ovules.

This species is based on *Villamil* 253 from ravines, at about 12 m. altitude, at Sandakan, Sabah, deposited in the herbarium of the Philippine Bureau of Science, fortunately photographed before its destruction in World War II. Merrill (1917) says "This is the first representative of the genus to be found in the Sunda Islands, several species being known from New Guinea, one from north-eastern Australia, and several from Polynesia. The present species is dedicated to Mr. D. M. Matthews, Conservator of Forests, British North Borneo, and differs from the genus as described in its distinctly 1-celled ovaries, and in its equal or subequal, not didynamous stamens. It is, however, in all essential characters a typical *Faradaya*."

By some botanists this species is reduced to the synonym of *F. papuana* Scheff. which has entirely glabrous inflorescences and for a time I tended to agree with this disposition of it, but on seeing more material I now feel that there are definitely two separate taxa involved.

Collectors have encountered *F. matthewsii* in open places in ravines and along forested roadsides in cacao plantations, at 12 m. altitude, in anthesis in June.

The *Holttum* 25116, distributed as *F. matthewsii*, actually is *Gmelina uniflora* Stapf.

Citations: GREATER SUNDA ISLANDS: Sabah: *Sinclair, Tassim, & Sisiron* 9262 (B, Ld, Mu), 9263 (Ld--photo, N--photo, W--2946376); *Villamil* 253 [5] (Bz--21023--isotype, Ld--photo of type, N--photo of type, Ph--type).

FARADAYA NERVOSA H. J. Lam, Verbenac. Malay. Arch. 232--233. 1919.

Bibliography: H. J. Lam, Verbenac. Malay. Arch. 229, 232--233, & 365. 1919; H. J. Lam in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 71, 72, 111, & xi. 1921; H. J. Lam in Lauterb., Engl. Bot. Jahrb. 59: 94. 1924; A. W. Hill, Ind. Kew. Suppl. 6: 85. 1926; Fedde & Schust., Justs Bot. Jahresber. 47 (2): 245. 1927; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 67 & 92 (1942) and ed. 2, 149 & 185. 1949; Mold., Résumé 201 & 455. 1959; Mold., Fifth Summ. 1: 336 (1971) and 2: 878. 1971; Mold., Phytol. Mem. 2: 326 & 547. 1980.

A large tree, to 30 m. tall; petioles 1.5--2.5 cm. long; leaf-blades coriaceous, elliptic-oblong, 13.5--19 cm. long, 6.5--8.5 cm. wide, apically obtusely acuminate, marginally entire, basally subacute, glabrous above, glabrous beneath except for the puberulent venation, some of which is covered by stout hairs, the axils glandless; secondaries 12--15 per side; flowering inflorescence not known, but the corolla white, glabrous, its tube short, cylindrical, about 1.7 cm. long, the lobes 1.5--2 cm. long, apically broadly rounded, sometimes bilobed; stamens 4, inserted in the throat of the corolla-tube; filaments 4--5 cm. long, glabrous; style filiform; stigma subulate; ovary not known; fruiting-calyx

bilobed to the base, the lobes apically acuminate bifid, externally minutely puberulent, covered by large glands.

This poorly known species is based on *Lauterbach 2822* from the Bismarck Plain, at 150 m. altitude, New Guinea, collected on September 9, 1896, and probably deposited in the Leiden herbarium. The detached flowers were found lying loose on the soil beneath the tree. Lam (1919) comments that "Our species, though based upon an incomplete specimen, is well distinguished by its many-nerved leaves, and shows an affinity with *F. dimorpha*, which, however, has only 5--7 pairs of nerves, and possesses glands in the axils of its lower nerves. Moreover, it has very large fruits."

Thus far the species is known, at least to me, only from the original collection.

FARADAYA OVALIFOLIA (A. Gray) Seem., Journ. Bot. Lond. 3: 258. 1865.

Synonymy: *Clerodendron* (*Tetrathyranthus*) *ovalifolium* A. Gray, Proc. Amer. Acad. Arts 6: 50. 1862. *Clerodendron arthurgordoni* Horne, Year Fiji 259, nom. nud. 1881. *Clerodendron gordonii* J. G. Baker, Journ. Linn. Soc. Lond. Bot. 20: 370. 1883. *Faradaya ovalifolium* (A. Gray) Seem. ex Mold., Alph. List Inv. Names 19, sphalm. 1942. *Clerodendrum gordonii* J. G. Baker ex Mold., Known Geogr. Distrib. Verbenac., ed. 1, 68 & 90. 1942. *Clerodendron ovalifolia* Gray apud Parham, Fiji Nat. Pl. 124. 1943. *Faradaya ovalifolia* var. *ovalifolia* [Seem.] apud Parham, Pl. Fiji Isls, ed. 1, 213. 1964. *Clerodendrum ovalifolium* (A. Juss.) Bakh. ex Beard, Descrip. Cat. W. Austr. Pl., ed. 1, 91. 1965. *Faradaya ovalifolia* "var. *ovalifolia*; J. W. Parham" apud A. C. Sm., *Allertonia* 1: 413, in syn. 1978.

Bibliography: A. Gray, Proc. Am. Acad. Arts 6: 50. 1862; Seem., Journ. Bot. Lond. 3: 257 & 258. 1865; Seem., Fl. Vit. 189 (1866) and 441. 1873; Horne, Year Fiji 259 & 262. 1881; J. G. Baker, Journ. Linn. Soc. Lond. Bot. 20: 270. 1883; F. Muell., Descr. Notes Papuan Pl., imp. 1, 8: 48. 1886; Drake del Castillo, Illust. Fl. Ins. Mar. Pac. 261. 1892; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 561 & 946. 1893; Gillespie, Bull. B. P. Bishop Mus. 83: 29--30 & 69, fig. 37. 1931; Worsdell, Ind. Lond. Suppl. 1: 402. 1941; Mold., Alph. List Inv. Names 16 & 19. 1942; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 68, 69, 90, & 92. 1942; Parham, Fiji Nat. Pl. 124. 1943; Mold., Phytologia 2: 103. 1944; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 561 & 946. 1946; H. N. & A. L. Mold., Pl. Life 2: 61. 1948; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 151, 181, & 185. 1949; Mold., Resume 206, 260, 267, 294, 450, & 455. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 561 & 946. 1960; Parham, Pl. Fiji, ed. 1, 213. 1964; Beard, Descrip. Cat. W. Austral. Pl., ed. 1, 91. 1965; Mold. in Menninger, Flow. Vines 334. 1970; Mold., Fifth Summ. 1: 343 & 452 (1971) and 2: 518 & 878. 1971; Parham, Pl. Fiji, ed. 2, 298. 1972; A. C. Sm., *Allertonia* 1: 413. 1978; F. . . Muell., Descr. Notes Papuan Pl., imp. 2, 8: 48. 1979; Mold., Phytol. Mem. 2: 333 & 547. 1980; Mold., Phytologia 51: 388, 389, & 395. 1982.

Illustrations: Gillespie, Bull. B. P. Bishop Mus. 83: 69, fig.

37. 1931.

A robust scandent shrub or liana, climbing to the tops of the tallest trees, to 15 m. long, or occasionally "a small tree" [Meebold 16486]; stems to 3 cm. in diameter, the younger parts thickly furfuraceous, glabrescent in age; branchlets terete; sap not milky; leaves large, decussate-opposite, furfuraceous when young, glabrous when mature; petioles stout, 1.2--2.5 cm. long; leaf-blades thickly chartaceous, broadly elliptic to obovate, 9--22 cm. long, 6--10 cm. wide, apically obtusely acuminate, basally narrowed and acute but not decurrent, green above, somewhat copper-colored beneath; secondaries 5--8 per side, prominulous above, very prominent beneath, arcuate-ascending; veinlet reticulation prominent, numerous, forming straight-sided "islets"; inflorescence lateral and (more often) terminal, to 15 cm. long, composed of about 8 main branches, 20- or more flowered; pedicels 6--20 mm. long, furfuraceous; bracts and bractlets foliaceous, furfuraceous, 6--11 mm. long, punctate; flowers relatively small, borne in dense clusters, odorless; calyx 3- or 4-lobed, the lobes subequal, about 4 mm. long and wide, apically acute and subapiculate, spreading; corolla hypocrateriform, varying from pure-white to creamy-white, to 8 cm. long, externally glabrous, internally minutely puberulent, the tube basally about 2 mm. wide, apically slightly ampliate, the lobes subrotund, about 1 cm. long and wide; filaments slender, pure-white, 3--4 cm. long, inserted about 2 cm. below the mouth of the corolla-tube, basally pubescent; anthers oblong, about 3 mm. long; style very slender, pure-white, exserted about 1 cm.; stigma shortly 2-lobed; fruit with usually 1 or 2 not developing, mostly in pairs, 4-parted at maturity, the drupes ellipsoid, oblique, 4--6 cm. long, 2 cm. wide, yellow or orange to orange-red or red with white dots, shiny, soft, the exocarp shriveled when dry, the endocarp very hard, 1-furrowed, about 1 mm. thick, 1-seeded; seeds coriaceous when dry, oblong, about 3.2 cm. long, the cotyledons filling the entire seed, plano-convex, apically truncate, conspicuously pinnate-veined within, the veins deeply and acutely canaliculate.

Gray's (1862) description of the species is short: "foliis ovalibus obtuse acuminatulis integerrimis basi subangulatis (cum petiolo ramisque teretibus) glabris, cymis plurifloris corymboso-paniculatis canescenti-puberulis; corolla hypocraterimorpha, tubo (ultra pollicari) calycem obtuse 4-lobum pluries excedentibus, lobis 4 rotundis inter se aequalibus stamina adaequantibus... Differs from (*C. amicorum*) somewhat in the foliage, but strikingly in the shape of the corolla." The type was collected by Wilkes on the United States Exploring Expedition in 1840 somewhere in the Fiji Islands and is deposited as sheet no. 75176 in the United States National Herbarium at Washington.

Collectors have found this plant growing in light or dense, open or wet forests, rainforests, secondary forests, logged-over areas, and thick low bush country, at 10--1200 m. altitude, in anthesis from February to August, and in fruit from June to August and October.

Smith (1978) asserts that *F. ovalifolia* "appears to be endemic to Fiji, where it is a frequent high-climbing liana with fragrant white flowers, occurring at elevations from near sea level to about 1,150 m. I have seen about 70 collections from the islands of Viti Levu, Kandavu, Ovalau, Vanua Levu, and Matuku."

Gillespie (1931) cites Gillespie 2181, 2182, 3166, 3513, & 4530, Parks 20036, 20386, & 20702, and Setchell & Parks 15063 from Viti Levu. He comments that this is "A species difficult to distinguish by the leaves from *Faradaya vitiensis* Seemann, in which they are thicker, coriaceous, and more inclined to be attenuate at the base, but easily recognized by the shape of the corollas, in *F. ovalifolia* being salver-shaped, and in *F. vitiensis* infundibuliform, the tube rather broad."

Vernacular names reported for *F. ovalifolia* are "ngakawa", "wakarovungi", "wa koro vundi", "wakoruvudi", "wakorovundi", "wa korovundi", "wa kuru vundi", "wa vatu", "wa vundi", "wavudi" and "wavundi".

Pigeons and doves are said to be fond of eating the fruit on this plant. Small wood samples accompany Gillespie 3166 & 3513 and St. John 18308.

Material has been misidentified and distributed in some herbaria as *Faradaya vitiensis* Seemann and *Fagraea berteriana* A. Gray. On the other hand, the Bryan 284, Degener 16743, and Smith 81, 1052, 1570, & 1845, distributed as *F. ovalifolia*, actually are *F. lehuntei* (Horne) A. C. Sm.

Citations: FIJI ISLANDS: Ovalau: J. W. Gillespie 4530 (Bi, Ca--448962, Du--245264); H. E. Parks 20439 (Bi); A. C. Smith 7523 (Hk, Ld, W--2190428). Viti Levu: E. H. Bryan 205 (W--1967665); O. Degener 14621 (A, N, N), 15333 (B, Bi, N, N, S, Vi); J. W. Gillespie 2181 (Bi, Ca--447645), 2182 (Bi, Bz--21019, Ca--447644), 2616 (Bi), 2979 (Bi, Ca--447943), 3166 [Bish. Mus. wood sample 1736] (Bi, Ca--448058), 3290 (Bi, Ca--448218, W); Lai s.n. [Macuata, Herb. Dept. Agr. 16685] (N); MacDaniels 483 (Ba); Meebold 16486 (Bi, Mu, Mu); H. E. Parks 20036 (Ba, Bi, Ca--447347, N, W--2192222), 20386 (Bi, Ca--447403, W--2192293), 20439 (Ca--447375, W--2192303), 20702 (Ca--447604); Pillay & Vualili L.8259a (W--2624354); Reay 19 (Ca--7922, W--1863496); St. John 18274 (Kl--9676, W--2185850), 18308 (Kl--9689, W--2185866); Setchell & Parks 15018 (Ca--289612), 15062 (Bi, Ca--469143, Ca--948547, W--1628918), 15063 (Ca--289443); A. C. Smith 4077 (Bi, N, N, S), 4636 (Bi, N, N, S), 4752 (Bi, N, N, S); J. Thurston s.n. (Er, Mb); Wilkes, U. S. Expl. Exped. s.n. [Feejee Islands] (Bi--photo of type, G--isotype, T--isotype, W--75176--type).

FARADAYA OVALIFOLIA var. *GLABRA* Mold., Phytologia 4: 53--54. 1952.

Bibliography: Mold., Phytologia 4: 53--54. 1952; Mold., Résumé 206 & 455. 1959; Mold., Fifth Summ. 1: 348 (1971) and 2: 878. 1971; A. C. Sm., Allertonia 1: 413. 1978; Mold., Phytol. Mem. 2: 233 & 547. 1980.

This variety differs from the typical form of the species in having its peduncles, inflorescence-branches, pedicels, and calyx completely glabrous, the corolla-tube heavy-textured, about 6 cm.

long and 3--4 mm. wide, the corolla-limb 2.5 cm. wide, and the leaf-blades more narrowly elliptic and firmer in texture.

This variety is based on *Gillespie* 3513 from the vicinity of Nasinu, at an altitude of 150 m., 9 miles from Suva, in Naitasiri province, Viti Levu, collected on October 24, 1927, and deposited in the Britton Herbarium at the New York Botanical Garden.

Collectors describe the plant as a tree, 8 m. tall, the trunk to 30 cm. in diameter, and the mature fruit yellow and orange. They have found it growing in dense forests to an altitude of 1090 m., in flower in October, and in fruit in December. Smith (1978) reduces this variety to synonymy under typical *F. ovalifolia*.

Material has been misidentified and distributed in some herbaria not only as typical *F. ovalifolia* (A. Gray) Seem., but also as *F. vitiensis* Seem.

Citations: FIJI ISLANDS: Viti Levu: *Gillespie* 3513 [Bish. Mus. wood sample 1822] (B--isotype, Bi--isotype, Ca--448325--isotype, N--type); *Greenwood* 966 (Bi, Ca--2143, N).

FARADAYA PAPUANA Scheff., Ann. Jard. Bot. Buitenz. 1: 42--43. 1876.

Synonymy: *Faradaija papuana* Wigman, *Teysmannia* 1: 489. 1890. *Faradaya splendida* K. Schum. ex K. Schum. & Lauterb., Nachtr. Fl. Deutsch. Schutzgeb. Südsee 370. 1905 [not *F. splendida* F. Muell., 1865]. *Faradaya excellens* K. Schum. ex Mold., *Phytologia* 34: 274, in syn. 1976. *Clerodendron fissicalyx* Scheff. ex Mold., *Phytol. Mem.* 2: 385, in syn. 1980.

Bibliography: F. Muell., *Descr. Notes Papuan Pl.*, imp. 1, 1: 91 & 113. 1875; Scheff., Ann. Jard. Bot. Buitenz. 1: 42--43. 1876; F. Muell., *Descr. Notes Papuan Pl.*, imp. 1, 8: 47. 1886; K. Schum. & Hollr., *Fl. Kais. Wilhelmsl.* 122. 1889; Wigman, *Teysmannia* 1: 489. 1890; Hook. f., *Curtis, Bot. Mag.* 117: pl. 7187. 1891; Scheff., Ann. Jard. Bot. Buitenz. 10: pl. 7, fig. 2. 1891; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, imp. 1, 1: 946. 1893; Warb., *Engl. Bot. Jahrb.* 18: 209. 1894; K. Schum. & Lauterb., *Fl. Deutsch. Schutzgeb. Südsee* 525. 1900; K. Schum. & Lauterb., *Nachtr. Fl. Deutsch. Schutzgeb. Südsee* 370. 1905; Nieuwenhuis, Ann. Jard. Bot. Buitenz. 21: 259, pl. 26, fig. 56 & 58. 1907; Pulle in Lorentz, *Nova Guinea*, ser. 1, 8 (2): 686. 1914; H. J. Lam, *Verbenac. Malay. Arch.* 234, 236, & 365. 1919; Pynaert, *Bull. Agric. Cong. Belg.* 11: 213, fig. 43. 1920; H. J. Lam in Lam & Bakh., *Bull. Jard. Bot. Buitenz.*, ser. 3, 3: 71. 1921; Stapf, *Ind. Lond.* 3: 173. 1930; Mold., *Suppl. List Inv. Names* 3. 1941; Mold., *Alph. List Inv. Names* 24. 1942; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, imp. 2, 1: 946. 1946; Mold., *Résumé* 192, 201, 203, 209, 218, & 455. 1959; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, imp. 3, 1: 946. 1960; Burkill, *Dict. Econ. Prod. Malay Penins.* 1: 1013. 1966; Corner & Watanabe, *Illust. Guide Trop. Pl.* 760. 1969; Mold., *Fifth Summ.* 1: 324, 336, 338, 346, & 363 (1971) and 2: 878. 1971; Hegnauer, *Chemotax. Pfl.* 6 [Chem. Reihe 21]: 676. 1973; Mold., *Phytologia* 28: 449 (1974) and 34: 274. 1976; F. Muell., *Descr. Notes Papuan Pl.*, imp. 2, 1: 91 & 113 (1979) and imp. 2, 8: 47. 1979; Mold., *Phytol. Mem.* 2: 315, 326, 328, 353, 385, 425, & 547. 1980; Mold., *Phytologia* 51: 392. 1982.

Illustrations: Scheff., Ann. Jard. Bot. Buitenz. 10: pl. 7, fig. 2. 1891; Nieuwenhuis, Ann. Jard. Bot. Buitenz. 21: pl. 26, fig. 56 & 58. 1907; Pynaert, Bull. Agric. Cong. Belg. 11: 213, fig. 43. 1920.

A tall-climbing liana, to 25 m. long, a large rambling shrub, or a tree to 5 m. tall; stems to 2 cm. in diameter; branchlets terete, the youngest ones short-pubescent; leaves decussate-opposite; petioles terete, 2.5--5 cm. long, somewhat twisted; leaf-blades elliptic-ovate or broadly ovate, 15--23 cm. long, 7--12 cm. wide, glossy or dull dark-green above, green beneath, apically obtuse, marginally entire, basally acute or obtuse to truncate or (on wider leaves) subcordate, glabrous on both surfaces when mature, with 4--6 orbicular glands near the larger veins beneath; secondaries 6--8 pairs, arcuate-ascending; veinlet reticulation dense and prominent beneath; inflorescence-branches densely puberulent or short-pubescent; cymes axillary and terminal, pedunculate, densely many-flowered, crowded, repeatedly trichotomous, much shorter than the subtending leaves; peduncles variable in length, long or short; pedicels very short, to 3 mm. long; bractlets small, subulate; flower-buds white or cream-color; flowers large, very showy, faintly sweet-scented; calyx large, usually about 1.8 cm. long, often unilaterally split during anthesis, later deeply 2-parted, externally bearing numerous glands; corolla white or greenish, its tube infundibular, almost 4 cm. long, ampliate at the throat, the limb spreading, the lobes 4 or rarely 5, subequal, about 1.8 cm. long, to 5 mm. wide, apically rounded to emarginate or bilobed; stamens 4 or rarely 5, inserted slightly above the base of the corolla-tube, exserted; filaments basally swollen and densely lanate, glabrous above, slender, almost isometrous; anthers versatile, 2-locular, the thecae basally divergent; ovary densely lanate, rather deeply 4-lobed, basally 1-locular, apically 4-locular; style equaling the stamens; stigma bifid, the branches short and equal; fruiting-calyx slightly incrassate; drupes 4 (or often only 1 by abortion), ellipsoid, at first green, later creamy-white, about 6.5 cm. long and 4 cm. wide, externally glabrous, apically obtuse, the pericarp fleshy, the endocarp spongy; seeds large, exalbuminous; cotyledons large, plicate; radicle inferior.

This is a species apparently endemic to New Guinea, but sometimes cultivated elsewhere for ornament. It is based on *Teijsmann* 6773 from West Irian. The synonymous *Clerodendron fissicalyx* is based on *Teijsmann* 6750 from Manoman, while *Faradaya excellens* is founded on *Lauterbach* 528 from West Irian.

Faradaya matthewsii Merr., of Sabah, is sometimes regarded as a synonym of *F. papuana*, which, in turn, is sometimes united with *F. splendida* F. Muell., but *F. papuana* is distinguished easily by its densely puberulent young branchlets and inflorescence-branches. It can usually be distinguished from *F. splendida* as follows:

Leaf-blades mostly elliptic, apically obtuse, basally acute to obtuse, inflorescences crowded; corolla-lobes only to 5 mm. wide; pedicels to 3 mm. long.....*F. papuana*.
 Leaf-blades mostly ovate, apically acute, basally truncate-rounded; inflorescences loose; corolla-lobes to 15 mm. wide; pedicels to

10 mm. long.....*F. splendida*.

Collectors have found *Faradaya papuana* growing in secondary rainforests and on terraces in lowland rainforests, at 1--500 m. altitude, in anthesis from May to August and October, in fruit in November. Kanehira & Hatusima refer to it as "scandent in strand forest, 6 m. tall." The corollas are described as having been "white" on Brass 1631, Kanehira & Hatusima 13072, and Pleyte 645 and "greenish" on Lauterbach 2238. The axillary peduncles are quite long on Streimann 34086 and very short (and the leaves insect-galled) on Lauterbach 528 (the so-called *F. excellens* form). Lauterbach 2528 is said to have come from a "5 m. tree", but perhaps it was just climbing on the tree.

Nieuwenhuis (1907) notes that "Auch bei dieser Spezies tragen sowohl die Laubblätter als die Kelche Nektarien.....Die Zahl der Kelchdrüsen wechselt zwischen 6--20; sie sind bereits makroskopisch als rundliche Flecken erkennbar. Auf dem Längsschnitt sieht man das sezernierende Gewebe, eine aus hohen Palisadenzellen bestehende Schicht. Ganz gleich gebaute Drüsen findet man zerstreut auf der Unterseite der ledrigen Blätter, besonders am Grunde derselben, aber auch in der Nähe des Mittelnervs. Eine Sekretion findet nur bei den allerjüngsten und den eben entfalteten Blättern statt. Auch die Kelchdrüsen sezernieren weit stärker an den Knospen als an den Blüten. Die endständigen Infloreszenzen tragen weisse Blüten; diese fruktifizieren. Die Knospen und allerjüngsten Blätter wimmeln zu jeder Tageszeit von Ameisen. Trotzdem werden die Blüten in hohem Masse perforiert; von 188 abgefallenen Blüten waren nur 2 nicht perforiert. Überdies haben die Blüten noch von einem Käfer (*Sphaerometopa*) zu leiden.....Ihre Nektarien sind bereits von Burck erwähnt worden. Näheres im speziellen Kapitel über Blütenperforation."

The White 1293, misidentified as *F. papuana* in some herbaria, actually represents *F. splendida* F. Muell.

Citations: NEW GUINEA: Papua: Buerlen 326 (Mb), 484 (Mb); Brass 1631 (Bz--21035); Carr 14951 (N); Streimann NGF.34086 (Mb). Territory of New Guinea: Clemens 1719 (Le--937.351, N); Hollrung 740 (Bz--21025). West Irian: Aet 465 (Bz--72961), 512 (Bz--72959); Herb. Lugd.-bat. 926.340-115 (Le); Kanehira & Hatusima 13072 (Bz--21028, N); Kostermans 2820 (Bz--26603); Lauterbach 528 (Mu--4481); Pleyte 645 (Bz--72672); Römer 284 (Bz--25570, Le--926.340-94); Teijsmann 6750 (Mb), 6773 (Bz--21029--isotype, Bz--21032--isotype, Bz--21033--isotype, Ld--photo of isotype, Le--922.64-113--isotype, Mb--isotype, N--isotype, N--photo of isotype); A. C. T. Thomsen 813 (Bz--21027, Le--922, 297-1002); Versteeg 1075 (Bz--21024, Bz--25571, Le--910.205-2237, It--13812). CULTIVATED: India: Gage 13289 (Bz--21041). Java: Herb. Hort. Bot. Bogor. XV.F.9 in part (Bz--26305, N), XV.F.9a (Bz--21036). Sri Lanka: Collector undetermined s.n. [Royal Botanic Garden, February 1887] (Pd).

FARADAYA PARVIFLORA Warb., Engl. Bot. Jahrb. 18: 208. 1894.

Synonymy: *Faradaya parviflora* var. *typica* H. J. Lam, Verbenac. Malay. Arch. 232. 1919.

Bibliography: Warb., Engl. Bot. Jahrb. 18: 208. 1894; K. Schum. & Lauterb., Fl. Deutsch. Schutzgeb. Südsee 524. 1900; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 170. 1902; Pulle in Lorentz, Nova Guinea, ser. 1, 8 (2): 686. 1914; H. J. Lam, Verbenac. Malay. Arch. 229, 231--232, & 365. 1919; H. J. Lam in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 71 & 72. 1921; H. J. Lam in Lauterb., Engl. Bot. Jahrb. 59: 94. 1924; Fedde & Schust., Justs Bot. Jahresber. 47 (2): 245. 1929; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 2, 170. 1941; Mold., Alph. List Inv. Names 24. 1942; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 67 & 92 (1942) and ed. 2, 149 & 185. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 3, 170. 1959; Mold., Résumé 201, 294, & 455. 1959; Mold., Fifth Summ. 1: 336 (1971) and 2: 519 & 878. 1971; Hartley, Dunstone, Johns, & Lamberton, Lloydia 36: 293. 1973; Farnsworth, Pharmacog. Titles 9 (1): xi. 1974; Mold., Phytologia 31: 398. 1975; Mold., Phytol. Mem. 2: 326 & 547. 1980; Mold., Phytologia 51: 397 & 398. 1982.

A woody, climbing shrub; branchlets 3-ribbed toward the top, sparsely and minutely hairy, eventually glabrescent; leaves ternate; petioles 2--3 cm. long, sparsely and minutely hairy, soon glabrescent; leaf-blades chartaceous, ovate, 10--14 cm. long, about 8 cm. wide, apically obtusely acuminate, marginally entire, basally cordate, glabrous and shiny above and also (except for the veinlet reticulation) beneath; secondaries 4--6 pairs; 3-plexi-nerved at the base of the blade, the lower pair reaching the middle of the leaf and with some glands in and below the axils; veinlet reticulation minutely pubescent beneath; cymes axillary, sparsely and minutely hairy, forming a large terminal inflorescence; bracts foliaceous, narrow, 2--4 cm. long; peduncles 12--16 cm. long; cyme-branches 2--4 cm. long; pedicels 0.5 cm. long; calyx glabrous, 1 cm long, 2- or 3-lobed to 1/3 or 1/2 its length, the lobes apically obtuse; corolla white, its tube 5--7 mm. long, glabrous, the lobes 1.5--2 cm. long, marginally sometimes fimbriate; stamens inserted in the throat of the corolla-tube, white, 5.5 cm. long; style slender, 5.5 cm. long; stigma shortly bifid; ovary 4-furrowed, externally white-hairy.

This species is based on *Ledermann 13021* from mountainous woods at Felsspitze near Kaiser-August river, New Guinea, at 1400--1500 m. altitude, collected on August 20, 1913. Other collectors have also encountered it in woods and disturbed lowland rainforests, flowering in August.

Schumann & Lauterbach (1900) cite *Hellwig 164* & *172*, while Hartley and his associates (1973) cite *nos. 10546* & *12283* from the Territory of New Guinea, where the species is apparently endemic.

FARADAYA PARVIFLORA var. *ANGUSTIFOLIA* H. J. Lam, Verbenac. Malay. Arch. 232. 1919.

Synonymy: *Faradaya parviflora* var. *angustifolia* "J. H. Lam" apud Fedde & Schust., Justs Bot. Jahresber. 47 (2): 245, sphalm. 1927. *Faradaya parviflora* var. *anaustifolia* J. H. Lam apud Fedde & Schust., Justs Bot. Jahresber. 47 (2): 245, sphalm. 1927.

Bibliography: H. J. Lam, Verbenac. Malay. Arch. 232 & 234. 1919; H. J. Lam in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 72.

1921; H. J. Lam in Lauterb., Engl. Bot. Jahrb. 59: 94. 1924; Fedde & Schust., Justs Bot. Jahresber. 47 (2): 245. 1927; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 67 & 92 (1942) and ed. 2, 149 & 185. 1949; Mold., Résumé 201 & 455. 1959; Mold., Fifth Summ. 1: 336 (1971) and 2: 878. 1971; Mold., Phytologia 31: 398. 1975; Mold., Phytol. Mem. 2: 326, 405, & 547. 1980.

This variety differs from the typical form of the species in having the leaf-blades 12--15 cm. long, only 3.5--6.5 cm. wide, apically acute, and basally cuneate.

It is based on *Ledermann 13022*, also from wood on mountains at what was then called Felsspitze in the Sepik Mountains near the Kaiser-August river, in northeastern New Guinea, at 1400--1500 m. altitude, collected on August 20, 1913. Warburg (1924) cites both *Ledermann 13021* and *13022* as this variety, but, according to Lam (1919) the former collection is the type collection of the typical form and it is the latter collection which was designated by him as the type of the variety.

FARADAYA PEEKELII (Markgraf) Mold., Résumé 204, 268, & 455, hyponym. 1959; comb. nov.

Synonymy: *Clerodendron peekelii* Markgraf, Notizbl. Bot. Gart. Berl. 10: 121. 1927.

Bibliography: Markgraf, Notizbl. Bot. Gart. Berl. 10: 121. 1927; A. W. Hill, Ind. Kew. Suppl. 8: 54. 1933; Mold., Résumé 204, 208, & 455. 1959; Mold., Fifth Summ. 1: 333 & 452 (1971) and 2: 878. 1971; Mold., Phytol. Mem. 2: 329 & 547. 1980.

A scandent, glabrous shrub; leaves decussate-opposite; petioles to 7 cm. long, glabrous; leaf-blades coriaceous, broadly ovate or orbicular, to 19 cm. long and 15 cm. wide, apically short-acuminate, marginally entire, basally rounded; glabrous on both surfaces, the venation all equally conspicuous; inflorescence axillary and terminal, cymose, many-flowered, basally with smaller ovate-lanceolate leaves partially connate with the peduncle, otherwise minutely bracteolate; flowers glabrous; calyx cyathiform, coriaceous, to 8 mm. long, 2- or 3-fid to beyond the middle, the lobes irregular and apically obtuse; corolla white, its tube to 12 mm. long and 2 mm. wide, the lobes 4, cuneiform, as long as the tube, apically obtuse, unequal; stamens 4, irregularly didynamous; filaments to 4 cm. long, glabrous; anthers ellipsoid, split to the middle; style filiform, 4 cm. long, glabrous; ovary obovate, 3 mm. long, 2 mm. wide, externally pubescent.

This species is based on *Peekel 969* from bush at Vunapope, Takubar, New Ireland, in the Bismark Archipelago. Markgraf (1927) comments that "Die Art gehört in die kleine Sektion *Tridens* H. J. Lam [of *Clerodendrum*] und weist einige Ähnlichkeit mit dem ebenfalls papuasischen *Cl. magnificum* Warb. auf, bei dem wie hier die Zahl der Kelchzipfel zwischen 2 und 3 schwankt."

In a personal communication to Dr. Lam from Dr. Van Steenis, dated December 5, 1938, he states that "Hierbij een ex. verzameld door Peekel (no. 145) op Bismarck Arch. door hem als *Clerodendron Peekelii* Markgr. ingezonden. Het is echter een *Faradaya*: groote bladvoerklieren, liaan! Er bestaat de mogelijkheid, dat Peekel zich

vergist heeft in zijn herinnering, van het nummer, wat Markgraf beschreven heeft in Notizbl. Berl.-Dahlem 10, 1927, p. 121. Hij geeft haast geen maten op vermeldt niet dat - zooals in dit nummer - de bloenkroonbuis in de keel sterk verwijd is, enz. terwijl Markgraf opgeeft, dat het een klimmende heester zou moeten zijn! Dit kan toch niet voor *Clerodendron*!!?? Het lijkt me daarom wel vrij zeker, dat *Clerodendron Peekelii* een *Faradaya* is!

"Je vermeldt in je diss. *Faradaya nervosa* H. J. L. als een 30 m hoge boom. Volgens je tabel zou deze soort ook geen klieren aan den bladvoet bezitten. Daar de bloemen los van de bladeren zijn verzameld door Lauterbach, lijkt mij vergissing hiet uitgesloten. *Faradaya*'s zijn klimmende heesters, doorgaans echte lianen, geen hoge boomen." While this is certainly in general true, it still remains that numerous collectors have described species of this genus as "trees". In the tropics it is often difficult to be certain how to describe a given plant specimen in the forest.

The lower leaves on *Peekel* 145 are basally truncate and very much broader than the others

Citations: BISMARK ARCHIPELAGO: New Ireland: *Peekel* 145 (Bz--72905, Bz--72906, N).

FARADAYA POWELLII Seem. ex Powell in Seem., Journ. Bot. 6: 342. 1868,

Synonymy: *Clerodendron powellii* Benth. & Hook. f. ex Drake del Castillo, Illust. Fl. Ins. Mar. Pacif. 261. 1892. *Faradaya savaiiensis* Rech., Denkschr. Akad. Wiss. Wien Math.-Nat. 85: 166. 1910.

Bibliography: Powell in Seem., Journ. Bot. 6: 342 & 384. 1868; Seem., Fl. Vit. 432 & 441. 1873; F. Muell., Descr. Notes Papuan Pl., imp. 1, 8: 48. 1886; Drake del Castillo, Illust. Fl. Ins. Mar. Pacif. 261. 1892; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 496. 1906; Rech., Denkschr. Akad. Wiss. Wien Math.-Nat. 85: 166. 1910; Rech., Bot. Ergebn. Sam. Sal.-Inseln 340, pl. 13, fig. B. 1910; Prain, Ind. Kew. Suppl. 4, imp. 1, 90. 1913; H. J. Lam, Verbenac. Malay. Arch. 319 & 365. 1919; Setchell, Carnegie Inst. Wash. Publ. 341: pl. 13. 1924; Setchell, Carnegie Inst. Dept. Marine Biol. 20: pl. 13B. 1924; Wangerin, Justs Bot. Jahresber. 53 (2): 644. 1925; Christophersen, B. P. Bishop Mus. Bull. 128: 193. 1935; A. W. Hill, Ind. Kew. Suppl. 9: 115, 1938; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 2, 496. 1941; Worsdell, Ind. Lond. Suppl. 1: 402. 1941; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 69 & 92 (1942) and ed. 2, 151 & 185. 1949; Van Steenis, Act. Bot. Néerl. 4: [477]. 1955; Prain, Ind. Kew. Suppl. 4, imp. 2, 90. 1958; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 3, 496. 1959; Mold., Résumé 207, 268, & 455. 1959; Mold., Résumé Suppl. 3: 32. 1962; Mold., Fifth Summ. 1: 351 & 453 (1971) and 2: 519 & 878. 1971; Farnsworth, Pharmacog. Titles 9 (3): ix. 1974; F. Muell., Descr. Notes Papuan Pl., imp. 2, 8: 48. 1979; Mold., Phytol. Mem. 2: 342 & 547. 1980; Mold., Phytologia 51: 390 & 396. 1982.

Illustrations: Rech., Bot. Ergebn. Sam. Sal.-Inseln pl. 13, fig.

B. 1910; Setchell, Carnegie Inst. Wash. Publ. 341: pl. 13. 1924; Setchell, Carnegie Inst. Wash. Dept. Marine Biol. 20: pl. 13B. 1924.

A large, slender or robust, climbing shrub or vine, sometimes ascending the highest trees, large-flowered, 8 or more m. long, or a tree, 3--4 m. tall [*Christophersen & Hume* 2232; *Garber* 552]; stems round, except at the flat nodes, ascending, glabrous, the sap not milky; leaves decussate-opposite; leaf-blades coriaceous, ovate-lanceolate, marginally entire, dark-green above, light-green beneath, punctate; in florescence axillary and terminal, paniculate; flowers large, with little or no odor or sweet-scented [depending on time of day?]; calyx inferior, regular, basally green, persistent, coriaceous, apically slightly 4-lobed, the tube and lobes white; corolla white, trumpet-shaped, regular, to 6 cm. long, 4-lobed, the lobes imbricate in bud; stamens 4, inserted in the corolla-tube and alternate with its lobes; filaments downwardly incurved in bud; anthers large, versatile, 4-celled, 2-lobed; style single, awl-shaped, longer than the corolla, arising from the base of the ovary-lobes; ovary borne on a large torus, 4-parted, apically 4-lobed, each part with 1 basal ovule; fruit large, to 12 cm. long and 5 cm. wide, curvate, at first green, later red or bright-red, fleshy, the drupes oblong, somewhat curvate, the epicarp thin and fleshy, the mesocarp bony.

Powell (1868) reports that "pigeons take three or four of these drupes into their gullet at once; hence [the fruits] are called 'mamalupe' (the pigeon's mouthful)".

The species is based on an unnumbered Powell collection from Samoa, where the plant is also called "filitavatio" and "mamagi".

Collectors have found this plant growing along roadsides and trailsides, in rocky soil, in open, wet, secondary, and ridge forests, on densely wooded slopes, in thickets, among secondgrowth, in bush country, on seashores and coasts, and on plateaus, from sealevel to 1700 m. altitude, and flower from June to April, and in fruit in January, March, August, and October. The corollas are uniformly described as "white". Wismer refers to the fruit as a "capsule" and avers that the "flowers and fruit appear simultaneously on the same plant". He refers to the plant as a "tall tree" [*Wismer* 53]. Other collectors also refer to it as a shrub or tree. Garber, however, describes it as a "vine on trees to great height".

Harris encountered the plant "in damp rocky soil under cover of light forest on gently hillside slopes"; Diefenderfer says that it occurs "on lowlands", but *Christophersen* (1935) reports it "common in the forests at all elevations". Bristol also refers to it as "climbing in forest trees". Its white flowers are used locally for making wedding wreaths.

Vernacular names reported for the species are "filitavatio", "fue", "fue vai", "mamagi", "mā mā lupe", "mama lupe", "mamā lupe", and "mamalupe" (meaning "pigeon's mouthful") because native pigeons feed on the fruit.

The original publication of this taxon is sometimes mis-cited as "Journ. Bot. 6: 382. 1888".

Faradaya savaiiensis is based on *Rechinger 3728* from Savaii, deposited in the Vienna herbarium. The synonym, *Clerodendron powellii*, is sometimes cited as having been published in Benth. & Hook. f., Gen. Pl. 2 (2): 1156 (1876), but this is not true.

I suspect that *F. powellii* may be conspecific with *F. amicorum* (Seem.) Seem., and the latter name would have priority. One cotype of *F. amicorum* in the Britton Herbarium exhibits leaves like those of typical *F. powellii*, i.e., not distinctly obovate. Dr. C. G. Van Steenis, in a letter to me dated August 27, 1955, is also of this opinion, saying: "By the way, do you think *F. powellii* Seem. ex Powell to be different from *F. amicorum*? I doubt this very much; I think they are conspecific." In his 1955 work he also indicates this same opinion.

Christophersen (1935) cites *Christophersen 781* and *Christophersen & Hume 2173 & 2232* from Savaii, *Garber 552 & 671* from Tau, *Christophersen 990 & 3478*, *Diefenderfer 1, 12, & 28*, and *Garber 913* from Tutuila, and *Christophersen 188, 299, & 340* and *Wilder 77* from Upolu.

The *Garber 671*, *Herb. A. Gray s.n.*, and *Kuntze 2300*, distributed as *F. powellii*, seem to me to be better regarded as representing *F. amicorum* (Seem.) Seem.

A tentative key for distinguishing *F. powellii* from some of its closest relatives follows:

1. Corolla infundibular.
 2. Leaf-blades membranous; native to the Samoan & Tongan Islands.
 3. Leaf-blades mostly obovate or obovate-elliptic, basally long-attenuate into the petiole.....*F. amicorum*.
 - 3a. Leaf-blades mostly broadly elliptic, basally mostly only acute.....*F. powellii*.
 - 2a. Leaf-blades subcoriaceous; native to Fiji and Tongan Islands.
 4. Pedicels glabrous.....*F. lehuntei* var. *degeneri*.
 - 4a. Pedicels puberulent.....*F. lehuntei*.
 - 1a. Corolla hypocrateriform.
 5. Corolla-tube less than 1.5 cm. long.....*F. salomonensis*.
 - 5a. Corolla-tube 2.5--8 cm. long.
 6. Pedicels puberulent; corolla-tube to 3.5 cm. long.....*F. ovalifolia*.
 - 6a. Pedicels glabrous; corolla-tube to 8 cm. long.....*F. ovalifolia* var. *glabra*.

Citations: SAMOAN ISLANDS: Ofu: *Yuncker 9445* (Bi, Dp--29001). Savaii: *Christophersen 781* (B, Bi, Ca--592454, N), 2232 (B, Bi, N); *Christophersen & Hume 2173* (Bi), 2232 (Ca--592218); *Rechinger 3728* (Bi--photo). Tau: *D. W. Garber 552* (Bi, Ca--592221); *W. Harris Lot-2524-Sta.262* (Bi); *Yuncker 9174* (Bi, Dp--29002). Tutuila: *Christophersen 990* (B, Bi, N), 3478 (B, Bi, Bz--21020, Ca--592442, N, W--1655754); *Diefenderfer 1* (Bi), 12 (Bi), 28 (Bi); *D. W. Garber 913* (Bi); *Kuntze s.n.* [Samoa, May 1904] (N); *McKee 2893* (Bi), 2945 (Bi); *Meebold 21356* (Mu); *Seale s.n.* [May 20, 1929] (Gg--176229, N), *s.n.* [May 26, 1929] (Gg--176228); *Setchell 64* (Bi, Ca--215607), 539 (Ca--216018); *Wisner 53* (Bi), 69 (Bi), 128 (Bi); *Yuncker 9301* (Bi, Dp--29003), 9387 (Bi, Dp--29004). Upolu: *Bristol 1961* (W--2675798),

2026 (Kl--10591, W--2675828); *Christophersen* 188 (B, Bi, Bz--21021, Ca--592234, N), 299 (Bi, Bz--21022, W--1655717), 340 (Bi); *Whistler* A.293 (W--2746147), W.783 (W--2738660); *Wilder* 77 (Bi).

FARADAYA SALOMONENSIS (Bakh.) Mold., *Phytologia* 4: 54. 1952.

Synonymy: *Faradaya amicorum* var. *salomonensis* Bakh., *Journ. Arnold Arb.* 16: 71--72. 1935.

Bibliography: Bakh., *Journ. Arnold Arb.* 16: 71--72. 1935; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 1, 68 & 92 (1942) and ed. 2, 150 & 185. 1949; Mold., *Phytologia* 4: 54. 1952; Mold., *Résumé* 204 & 455. 1959; G. Taylor, *Ind. Kew. Suppl.* 12: 59. 1959; Whitmore, *Guide Forests Brit. Solom. Isls.* 141 & 181. 1966; Mold., *Fifth Summ.* 1: 340 (1971) and 2: 878. 1971; Mold., *Phytol. Mem.* 2: 330 & 547. 1980; Mold., *Phytologia* 51: 391 & 396. 1982.

A limber, often scandent, woody shrub or very large liana or sometimes "a small terrestrial shrub" [Brass 2635], occasionally showy, the whole plant slightly aromatic, at first appressed-puberulent but finally glabrescent; stems gray, smooth; bark brown, lenticellate, brittle; sap not milky; flowering branchlets cinereous-subsericeous; leaf-blades very variable, lanceolate-oblong or obovate, 7--20 cm. long, 3.5--10 cm. wide, apically attenuate to a shortly and subacutely acuminate apex, basally narrowed to an acutely or obtusely cuneate base, marginally entire, pale and glabrous on both surfaces; secondaries 5--7 per side; inflorescence axillary or in showy many-flowered terminal panicles, the cymes trichotomous, basally conspicuously bracteolate; bracts and bractlets oblong-elliptic or sub lanceolate, 1--2.5 cm. long, 3--10 mm. wide, silvery-gray and sericeous on both surfaces; peduncles silvery-gray; flower-buds pedicellate, globose; pedicels terete, slender, 5--15 mm. long, gray-sericeous, basally bracteolate; calyx 5--6 mm. long, 7--10 mm. wide, apically truncate and undulate or dentate to distinctly lobed; corolla white, hypocrateriform, glabrous on both surfaces, its tube variable, 1--1.5 cm. long, the lobes ovate or suborbicular, glabrous, marginally ciliate; stamens long-exserted, glabrous; style filiform, to 3 cm. long, glabrous; fruiting-calyx accrescent, often irregularly split, externally sparsely pubescent, but eventually glabrescent (except for the very base); fruit rather large, by abortion consisting of a single pyrene, the pyrenes elongate, 3--4 cm. long, 1.5--2 cm. wide, the nutlets glabrous, appendiculariform, the entire fruit fleshy and red when mature.

The species is based on Brass 2635 from Waimamura, at 50 m. altitude, on San Cristoval island, collected on August 11, 1932, and on Brass 3399 from Tiratoña, at 600 m. altitude, on Ysabel island, in the Solomon Islands, collected on December 29, 1932. Brass reports that the species is a common very large liana climbing on littoral rainforest trees, but is has also been collected up to 1200 m. altitude, in flower and fruit in August.

Bakhuizen (1925) notes that this taxon may not be "really different from the typical *F. amicorum*, but differs in its completely glabrous corollas."

The Whitmore 2460, 2781 and 3399, cited by Whitmore (1966) as an

unidentified species of *Faradaya*, probably represent the present species. Vernacular names recorded for it are "kwalo ebo" and "naosokoña".

Material of *F. salomonensis* has been misidentified and distributed in some herbaria as *F. splendida* F. Muell.

Citations: SOLOMON ISLANDS: Guadalcanal: Kajewski 2543 (Bi, Bz--21042). San Cristoval: Brass 2635 (Bi--cotype, Bz--21010--cotype), 2642 (Bi, Bz--21007). Ysabel: Brass 3399 (Bi--cotype, Bz--21005--cotype, Ld--photo of cotype, N--photo of cotype).

FARADAYA SPLENDIDA F. Muell., *Fragm. Phyt. Austr.* 5: 21--22. 1865 [not *F. splendida* K. Schum., 1905].

Synonymy: *Faradaija splendida* Wigman, *Teysmannia* 1: 488. 1890. *Farradaya splendida* F. Muell. ex Mold., *Suppl. List Inv. Names* 3, in syn. 1941. *Faraday splendida* F. Muell. ex Datta, *Handb. Syst. Bot.* 182, sphalm. 1965.

Bibliography: Seem., *Journ. Bot. Lond.* 3: 257 & 258. 1865; Seem., *Fl. Vit.* 190. 1866; F. Muell., *Fragm. Phyt. Austr.* 5: 21--22 (1865) and 6: 153. 1868; Benth. & F. Muell., *Fl. Austral.* 5: 69. 1870; Seem., *Fl. Vit.* 441. 1873; F. Muell., *Descr. Notes Papuan Pl.*, imp. 1, 6: 47 & 48. 1875; F. Muell., *Sec. Syst. Census Austr. Pl.* 1: 173. 1889; K. Schum. & Hollr., *Fl. Kais. Wilhelmsl.* 122. 1889; F. M. Bailey, *Cat. Indig. Nat. Pl. Queensl.* 35. 1890; Wigman, *Teysmannia* 1: 488--489. 1890; Hook. f., *Curtis Bot. Mag.* 117: pl. 7187. 1891; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, imp. 1, 1: 946. 1893; Warb., *Engl. Bot. Jahrb.* 18: 209. 1894; Briq. in Engl. & Prantl, *Nat. Pflanzenfam.*, ed. 1, 4 (3a): 174. 1895; K. Schum. & Lauterb., *Fl. Deutsch. Schutzgeb. Südsee* 524--525. 1900; F. M. Bailey, *Queensl. Fl.* 4: 1165 & 1181. 1901; F. M. Bailey, *Compreh. Cat. Queensl. Pl.* 385 & 386, fig. 363. 1913; Hamlyn-Harris & F. Sm., *Mem. Queensl. Mus.* 5: 1--22. 1916; H. J. Lam, *Verbenac. Malay. Arch.* 229, 234--236, & 365. 1919; H. J. Lam in Lam & Bakh., *Bull. Jard. Bot. Buitenz.*, ser. 3, 3: 71. 1921; H. J. Lam in Lauterb., *Engl. Bot. Jahrb.* 59: 94--95. 1924; H. J. Lam in Bakh. & Lam, *Nova Guinea* 14 *Bot.* 1: 169--170. 1924; Bakh., *Journ. Arnold Arb.* 10: 72. 1929; Bakh. in White, *Journ. Arnold Arb.* 10: 264. 1929; Howes, *Kew Bull. Misc. Inf.* 1930: 145. 1930; Stapf, *Ind. Lond.* 3: 173. 1930; Junell, *Symb. Bot. Upsal.* 1 (4): 109, 110, pl. 6, fog. 3, & text fig. 173. 1934; Mold., *Suppl. List Inv. Names* 3. 1941; Kanehira & Hatusima, *Bot. Mag. Tokyo* 56: 114. 1942; Mold., *Alph. List Inv. Names* 21. 1942; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 1, 66, 67, 69, 73, & 92. 1942; Lam & Meeuse, *Blumea* 5: 236. 1945; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, imp. 2, 1: 946. 1946; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 2, 147, 149, 153, 160, & 185. 1949; Webb, *Bull. Sci. Indust. Res. Org. Melbourne* 241: 53. 1949; Sastri, *Wealth India* 4: 7, fig. 5. 1956; Mold., *Résumé* 194, 195, 201, 202, 209, 218, 294, & 455. 1959; Jacks. in Hook. f. & Jacks., *Ind. Kew.*, imp. 3, 1: 946. 1960; Willaman & Schubert, *Agr. Res. Serv. U. S. Dept. Agr. Tech. Bull.* 1234: 236. 1961; Datta, *Handb. Syst. Bot.* 182. 1965; Maheshwari & Singh, *Dict. Econ. Pl. India* 69. 1965; Burkill, *Dict. Econ. Prod. Malay Penins.* 1: 1013. 1966; Mold., *Résumé Suppl.* 15: 20 (1967) and 16: 13. 1968; Burns &

Rotherham, Austral. Butterflies 94. 1969; Corner & Watanabe, Illustr. Guide Trop. Pl. 760. 1969; Mold. in Menninger, Flow. Vines 334. 1970; Mold., Fifth Summ. 1: 324, 333, 336, 338, & 346 (1971) and 2: 519 & 878. 1971; T. B. Muir, Muelleria 2: 166. 1972; Hegnauer, Chemotax. Pfl. 6 [Chem. Reihe 21]: 675. 1973; Gibbs, Chemotax. Flow. Pl. 3: 1753 & 1754. 1974; Mold., Phytologia 28: 449. 1974; Lord, Trees Shrubs Austr. Gard., ed. 5, 376. 1978; F. Muell., Descr. Notes Papuan Pl., imp. 2, 6: 47 & 48. 1979; Mold., Phytol. Mem. 2: 315, 323, 326, 328, 336, 353, & 547. 1980; Mold., Phytologia 51: 388, 389, 392, 393, & 395. 1982.

Illustrations: Hook. f., Curtis Bot. Mag. 117: pl. 7187 (in color). 1891; F. M. Bailey, Compreh. Cat. Queensl. Pl. fig. 363. 1913; Junell, Symb. Bot. Upsal. 1 (4): 110, text fig. 173, & pl. 6, fig. 6. 1934; Sastri, Wealth India 4: 7, fig. 5. 1956; Corner & Watanabe, Illustr. Guide Trop. Pl. 760. 1969.

A strong-growing or rambling ornamental vine or liana, to 20 m. long, or large, scrambling, and mostly glabrous shrub, occasionally prostrate, or even a small erect tree when growing in the open; stems pale-brown or pale greenish-brown; branchlets at first minutely puberulent but eventually glabrescent; wood brown, coarse-grained; leaves decussate-opposite; petioles 1.5--5 cm. long, sometimes at first minutely puberulent, eventually glabrous; leaf-blades chartaceous or subcoriaceous, pale- or dark-green and glossy above, ovate or oblong-elliptic to subrotund, 11--30 cm. long, 7--12.5 cm. wide, apically acuminate or acute, sometimes subobtusate, marginally entire, basally rounded to truncate or deeply cordate, glabrous on both surfaces except for the minutely puberulent prominent venation beneath; secondaries 5--7 pairs, with 1--10 glands in (or just below) the axils of the lowest pair beneath, sometimes with some scattered glands on both surfaces; inflorescence axillary and terminal, cymose, mostly lax, glabrous or subglabrous, the upper ones sometimes forming a large panicle; peduncles 2.5--6 cm. long; flowers large, very showy, fragrant with the odor of *Dianthus caryophyllus*; pedicels 0.3--1.4 cm. long; calyx green or pale-green, 1.5--2.5 cm. long, usually bilobed to about the middle, externally minutely puberulous, with some large external glands, the lobes apically acute; corolla white or greenish, externally glabrous, its tube slender, infundibular, 2--4 cm. long, the limb 4- (or rarely 5-) lobed, occasionally somewhat bilabiate, with a line of soft hairs or subglabrous, the lobes about 2 cm. long, to 1.5 cm. wide; stamens 4 (or sometimes 5), exserted, inserted near the middle [or at the base?] of the corolla-tube, the place of insertion long-pilose; filaments white, about 6.5 cm. long, basally long-pilose; anthers cream-color or pale-brown, exserted; style white, about 6.5 cm. long; stigma shortly bifid; fruit ovoid, usually composed of 4 (sometimes 1--3 by abortion) basally connate pyrenes, each 1-seeded, externally glabrous or minutely puberulous, sometimes slightly verruculose.

This is the type species of the genus and is native to Australia, New Guinea, and the Aroe and Talaut Islands and is widely cultivated outdoors for ornament in tropical portions of both hemispheres and in greenhouses elsewhere. *Faradaya papuana* Scheff. and *F. alber-*

tisii F. Muell. are sometimes regarded as conspecific with *F. splendida*, but are probably distinct, albeit very closely related, taxa. A tentative key to distinguishing these species follows:

1. Inflorescence only axillary.....*F. albertisii*.
- 1a. Inflorescence only terminal or both axillary and terminal.
 2. Leaf-blades elliptic, apically obtuse, basally acute to obtuse; inflorescence dense; corolla-lobes to 5 mm. wide; pedicels to 3 mm. long.....*F. papuana*.
 - 2a. Leaf-blades ovate, apically acute, basally rounded to truncate; inflorescence lax; corolla-lobes to 15 mm. wide; pedicels to 10 mm. long.....*F. splendida*.

The acrid fruit of *Faradaya splendida* is said to be edible.

The middle layer of bark in the stems is a powerful fish-poison, effective and rapid in killing fish and other aquatic animals even when used in great dilution, the active principle being a saponin. The roots have been found to contain an alkaloid substance. The species is the host foodplant of the common oakblue butterfly (*Narathura micale amphis*).

Hamlyn-Harris & Smith (1916) give an interesting account of the use of this plant as a fish-poison: "Portions of the vine.... are cut into foot lengths; the outer layer of the bark is removed and rejected, the middle layer alone being preserved. This is carefully scraped off and made up in shapely little piles on fresh green leaves. When a sufficiency is obtained it is rubbed on to stones previously heated by fire. The stones being then thrown into a creek or a little lagoon left by the receding tide, the poison becomes disseminated, with fatal results to all fish and other marine animals.

"Approached as to his opinion as to whether the use of specific portions of the plant was arrived at by accident or coincidence, 'The Beachcomber', whose numerous contributions to Queensland Ethnology are of the greatest possible value, and who speaks from first hand knowledge, states:-- 'I am fairly certain, from the mental qualities of the race, that most of its discoveries were accidental, though in the case of "Kole-Han" there must have been investigation. I am of the opinion that the crescent of the fish-hooks was evolved from the way in which a certain oyster-shell weathers on the beach, and that indeed Nature showed the several stages of the process of making, for I have found models of them all. Do not the inventions of the moderns prove the theory of evolution? With few exceptions each embraces gradual improvements on the original germ. In the case of most of the fish-poisons it seems to me safe to believe that they result from the happy chance.'"

There is not sufficient accurate information available as yet to enable me to offer a definitive key to all the taxa tentatively accepted at this time, but a tentative one to at least most of the taxa may be presented as follows:

1. Inflorescence only axillary or cauliflorous.
2. Inflorescence in the axils of existing leaves, not cauliflorous.....*F. albertisii*.
- 2a. Inflorescence cauliflorous

3. Native of Papua.....*F. dimorpha* var. *cauliflora*.
3a. Native of the Fiji Islands.....*F. vitiensis*.
1a. Inflorescence terminal only or both axillary and terminal,
paniculate, not cauliflorous.
4. Leaves often ternate or both subopposite and ternate.
5. Leaf-blades with up to 10 orbicular glands in the axils of
the lowest secondaries on the under leaf-surface.....
F. dimorpha.
5a. Leaf-blades with only a few or no glands...*F. ternifolia*.
4a. Leaves regularly decussate-opposite.
6. Stamens distinctly didynamous.
7. Flowers very large; calyx 2.5--5.5 cm. long; corolla-
lobes 5 cm. long, bifid to the middle; stamens 14 cm.
long or longer.....*F. magniloba*.
7a. Flowers smaller; calyx not over 2.5 cm. long; corolla-
lobes 2.5 cm. long; stamens 7.5 cm. long.
8. Lower leaf-surface with stellate scales...*F. squamata*.
8a. Lower leaf-surface without scales....*F. albertisii*.
6a. Stamens irregularly, not distinctly, or not at all didyn-
amous.
9. Flowers very large; calyx 2.5--5.5 cm. long; corolla-
lobes 5 cm. long, bifid to the middle; stamens 14 cm.
long or longer.....*F. magniloba*.
9a. Flowers smaller; calyx to 2.5 cm. long; corolla-lobes
2.5 cm. long, not bifid.
10. Lower leaf-surface with stellate scales...*F. squamata*.
10a. Lower leaf-surface without scales.
11. Leaf-blades with several, prominent, discoid glands
near the base beneath.
12. Leaf-blades completely glabrous beneath.....
F. matthewsii.
12a. Leaf-blades minutely puberulent on the venation
beneath.
13. Inflorescence lax, the branches glabrate or sub-
glabrate; pedicles to 14 mm. long; calyx mostly
over 2 cm. long during anthesis; corolla-lobes
to 15 mm. wide; leaf-blades broadly ovate or
ovate-elliptic, basally mostly cordate or sub-
cordate, apically acute or short-acuminate....
F. splendida.
13a. Inflorescence dense, the branches densely puber-
ulent; pedicels only to 3 mm. long; calyx only
1.6--2 cm. long during anthesis; corolla-lobes
only to 5 mm. wide; leaf-blades usually more
narrowly ovate or elliptic, basally rounded or
truncate, apically long-acuminate...*F. papuana*.
11a. Leaf-blades without prominent discoid glands or, at
most, with only a very few.

14. Young branchlets, bracts, peduncles, and pedicels tomentellous or gray-sericeous.
15. Corollas pubescent.....*F. amicorum*.
- 15a. Corollas glabrous.....*F. salomonensis*.
- 14a. Young branchlets, bracts, peduncles, and pedicels merely puberulent or glabrous.
16. Stamens inserted in the throat or near the middle of the corolla-tube; leaves opposite.
17. Leaf-blades basally distinctly pili-nerved, the lowest pair of secondaries reaching the middle of the leaf; corolla-tube 0.5--1 cm. long; secondaries 4--6 pairs.
18. Leaf-blades basally cordate, apically obtusely attenuate, 10--14 cm. long and 8 cm. wide.....
F. parviflora.
- 18a. Leaf-blades basally cuneate, apically acute, 12--15 cm. long and 3.5--6 cm. wide.....
F. parviflora var. *angustifolia*
- 17a. Leaf-blades basally not distinctly pili-nerved; the lowest pair of secondaries not reaching the middle of the leaf; corolla-tube 1.5--1.7 cm. long; secondaries 6--8 pairs.....*F. nervosa*.
- 16a. Stamens inserted near the base of the corolla-tube; leaves often ternate.....*F. ternifolia*.

This strictly tentative key does not include all the taxa treated in the present work and is based mainly on the key presented by Lam (1919), the last monographer of the genus.

Vernacular names reported for *F. splendida* are "buku", "koie-han", "koie-yan", "latára", "mumuni". and "pitutu".

Hooker (1891) says that "*F. splendida* was first collected at Rockingham Bay, by Mr. Dallachy, and has since been found (in 1873) much further north, in the Cape York Peninsula, by Mr. W. Hann, about thirty miles from the coast.....Mr. Hann describes the fruit as the size, shape, and colour of a hen's egg, and containing a very acrid kernel." He further states that the species was introduced into England with material sent to Kew from the Brisbane Botanical Garden in 1879 and that "it now forms a climber in the Palm House, the branches of which extend for some distance along the gallery rail, and almost reach the top of the house, 60 ft. above the ground. It is conspicuous by its handsome bright green foliage, and copious panicles of very fragrant snow-white flowers." Burkill (1966) reports that "It grows freely in the Botanic Garden" at Singapore.

Recent collectors have encountered the species on the banks of creeks and in riverine forests and rainforests, in anthesis in June and December. Lord (1978) lists it as cultivated in Brisbane, describing it as having "showy white flowers, 2 inches [long], cup-shaped, 4-lobed, in large clusters at [the] ends of shoots; 6--12 inch leaves, and berries the size and colour of a fowl's eggs." The fruits, of course, are not berries, but are drupes.

Corder & Watanabe (1969) describe the fruit as "large, white, potato-like". Schumann & Hollrung (1889) cite Hollrung 740 from

New Guinea. Lam (1924) cites *Hollrung* 740, *Lauterbach* 1695, 2238, & 2528, *Ledermann* 7925 & 12283, *Moszkowski* 117 & 154, and *Schlechter* 16411 from New Guinea and comments that "Die Verschiedenheit der Angaben über den Habitus der Pflanze (Strauch, Kletterer, Baum) ist etwas auffallend. Vielleicht liegen doch mehrere Arten vor [he regards *F. albertisii* F. Muell. and *F. papuana* Scheff. as synonyms of *F. splendida*], vielleicht aber erscheint hier wieder der Fall, wo innerhalb der Art sowohl die kletterform wie der aufrechte Habitus vorkommt, je nachdem die Pflanze im Walde oder im Freien ihren Standort hat." From New Guinea he cites Lam 475, *Teijsmann* 6773, *Thomsen* 813, and *Versteeg* 1075. Bakhuizen (1929) cites Brass 822 & 1631, also from New Guinea.

Gibbs (1974) reports that syringin is absent from the stems and that the plants give negative results to the HCl/methanol test.

Schumann & Lauterbach (1900) cite *Hollrung* 740 and *Lauterbach* 3128 from New Guinea, and point out that the species was "Bisher [nur] von Australien bekannt. Warburg ist (Pl. *Hollrung* 209) der Meinung, dass die Pflanze nicht richtig bestimmt ist, dass sie vielleicht mit *F. papuana* Scheff. im Überein stimmt."

Djamber refers to *F. splendida* as occurring in "open-forested swamps". Other collectors have encountered it along riversides and in secondgrowth of rainforests, at 20--1900 m. altitude, flowering from April to November, and in fruit in July, September, and October. Brass refers to it as "prostrate on dry gravelly riverbeds, the branches several m. long"; Hoogland & Pullen describe it as a "climber on low shrubs", while White refers to it as a "common vine in rainforest trees". Hoogland & Womersley found it "fairly common climbing high in trees at edges of secondary forests on brown-gray soil of volcanic origin".

Wigman (1890) asserts that the species is mentioned in "Gardeners Chronicle No. 194 vol. VIII" (1877), but I fail to locate any reference to it there.

The corollas are described as "white" on all collections seen by me where the corolla-color is mentioned at all.

Material has been misidentified and distributed in some herbaria as *F. papuana* Scheff., *Fagraea* sp., and *Loganiaceae*. On the other hand, Carr 12618 is a mixture of *F. splendida* with something not verbenaceous.

Citations: GREATER SUNDA ISLANDS: Karakalong: Lam 3342 (Bz--21038, Bz--21039, Bz--25697, Le--93260, N). NEW GUINEA: Papua: Brass 7442 (Le--938.187-388), 7770 (Le--938.187-362), 8200 (Le--938.187-369), 23923 (Ng--17089); Carr 11594 (Le--936114-276, N), 12618 in part (N); Hoogland & Womersley 3243 (Ng--16840, Ng, W--2213514). Territory of New Guinea: Hoogland 5158 (Ng--8324); Hoogland & Pullen 6263 (Ng--16841), 6265 (Ng--16841); Schlechter 16411 (S); Womersley 3757 (Ng--6482, Ng--16896), 4179 (Ng--16861). West Irian: Aet 508 (Bz--72962); Djambari 378 (Ng--16951, Ng); Gjellerup 729 (Le--926.340-217); Lam 475 (Bz--21026, Bz--21031, Le--924.324-550); LeRoux s.n. [Van Leeuwen 9101] (Bz--72669); Thomsen 623 (Bz--21030, Le--924.324-535, N). NEW GUINEAN ISLANDS: Japan: Aet & Idjan 533 (A, Bz--72979). AROE ISLANDS: Treub s.n. (Bz--25698). AUSTRALIA: New South Wales: Cambage s.n. [Fort of Bellerden, 14-8-13] (W--917526). Queensland: Fristedt s.n.

[Jul. 1889] (S); *Kajewski* 1293 (S); *H. Reed* 12532 (N); *C. T. White* 1293 (Kr, N, S). CULTIVATED: Australia: *C. T. White* 8624 (B, Ba, Bi). Dominica: *L. H. Bailey* 825 (Ba, Ba). Singapore: *Nur s.n.* [29 Dec. 1924] (Ba). Sri Lanka: *Alston s.n.* [November 6, 1927] (Pd); *Collector undetermined s.n.* [March 1896] (Pd, Pd). MOUNTED ILLUSTRATIONS: *Drake del Castillo*, *Illustr. Fl. Ins. Mar. Pacif.* pl. 44. 1892 (Ld); *F. M. Bailey*, *Compreh. Cat. Queensl.* Pl. fig. 363. 1913 (Ld); *Hook. f.*, *Curtis Bot. Mag.* 117: fig. 7187. 1891 (Ld).

FARADAYA SQUAMATA H. J. Lam, *Verbenac. Malay. Arch.* 230. 1919.

Bibliography: H. J. Lam, *Verbenac. Malay. Arch.* 229, 230, & 365. 1919; H. J. Lam in Lam & Bakh., *Bull. Jard. Bot. Buitenz.*, ser. 3, 3: 71--72. 1921; H. J. Lam in *Lauterb.*, *Engl. Bot. Jahrb.* 59: 94. 1924; A. W. Hill, *Ind. Kew. Suppl.* 6: 85. 1926; *Fedde & Schust.*, *Justs Bot. Jahresber.* 47 (2): 245. 1927; *Mold.*, *Known Geogr. Distrib. Verbenac.*, ed. 1, 67 & 92 (1942) and ed. 2, 149 & 185. 1949; *Mold.*, *Résumé* 201 & 455. 1959; *Mold.*, *Fifth Summ.* 1: 336 (1971) and 2: 878. 1971; *Mold.*, *Phytol. Mem.* 2: 326 & 547. 1980.

A climbing shrub; branchlets glabrous or glabrescent; leaves ternate-verticillate; petioles about 1.5 cm. long and 4 mm. wide, transversely plicate-alate; leaf-blades coriaceous, oblong-elliptic, about 24 cm. long and 10 cm. wide, apically acuminate, marginally entire, basally slightly or moderately cordate, glabrous and shiny above, glabrous and glandular-punctate beneath and covered with many stellate scales; secondaries 8 per side, very prominent and tomentellous beneath; cymes pedunculate, aggregated toward the tips of the branchlets into a composite terminal sub-umbelliform panicle; pedicels about 5 mm. long; calyx during anthesis 10--13 mm. long, externally tomentellous, elongate-subulate-acuminate, in bud the acumination 2--4 mm. long; stamens 4, white, inserted in the throat of the corolla-tube; corolla white (seen only in bud).

This species is based on *Ledermann* 13117 from Felsspitze, in the Sepic Mountains, near Kaiserin-Augusta River, in northeastern New Guinea, collected in bud on September 24, 1913. It is known thus far only from the original collection and Lam (1919) comments that "Although the specimen was an incomplete one, we think to be allowed to base upon it a new species being characterised by its ternate leaves, the stellate scale on the lower side, and its dense inflorescence." It is worth noting that the type locality for this species appears to be the same as for *F. parviflora* Ward. and its var. *angustifolia* H. J. Lam.

FARADAYA TERNIFOLIA F. Muell., *Descr. Notes Papuan Pl.*, imp. 1, 8: 46--48. 1886.

Bibliography: F. Muell., *Descr. Notes Papuan Pl.*, imp. 1, 8: 46--48. 1886; K. Schum. & Hollr., *Fl. Kaiser. Wilhelmsl.* 122. 1889; *Hook. f.*, *Curtis Bot. Mag.* 117: pl. 7187. 1891; *Durand & Jacks.*, *Ind. Kew. Suppl.* 1, imp. 1, 1: 170. 1902; *Pulle in Lorentz*,

Nova Guinea, ser. 1, 8 (1): 402 (1911) and ser. 1, 8 (2): 686. 1914; H. J. Lam, Verbenac. Malay. Arch. 229, 236, & 365. 1919; H. J. Lam in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 71 & 72. 1921; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 2, 1: 170. 1941; Mold., Known Geogr. Distrib. Verbenac., ed 1, 67 & 92 (1942) and ed. 2, 149 & 185. 1949; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 3, 1: 170. 1959; Mold., Résumé 201 & 455. 1959; Mold., Résumé Suppl. 15: 13. 1967; Mold., Fifth Summ. 1: 336 (1971) and 2: 878. 1971; T. B. Muir, Muelleria 2: 166. 1972; F. Muell., Descr. Notes Papuan Pl., imp. 2, 8: 46--48. 1979; Mold., Phytol. Mem. 2: 326 & 547. 1980; Mold., Phytologia 51: 396. 1982.

A climbing shrub; leaves usually ternate, sometimes subopposite; petioles short; leaf-blades thin-chartaceous or subchartaceous, oblong-lanceolate, apically short-acuminate, shiny on both surfaces, the lower surface with only a few or no orbicular glands; secondaries ascending, rather prominent beneath and the veinlet reticulation there also conspicuous; inflorescence shorter than the subtending leaves; primary and secondary peduncles very shortly abbreviated; calyx in bud rather small, pyriform-ovate, apically short-acuminate or only minutely apiculate, 2-lobed, eventually imperfectly bivalvate by a longitudinal split; corolla externally minutely puberulent; stamens inserted near the base of the corolla-tube; filaments basally densely barbate-villous; anthers ovate, downwardly bilobed; style glabrous, ovary depressed-globular, 4-sulcate, externally minutely pubescent or thinly velvety.

This species is based on an unnumbered F. von Mueller collection from the Strickland River, Papua, in southern New Guinea. Lam (1919) comments that "Its affinity is with *F. splendida* and *F. Albertisii*, but its leaves are not narrower above the middle than beneath it, and its calyx is much shorter. It has a general resemblance with *F. Vitiensis*, from the Fitchi-Islands. Mueller (1886) says that "This species is easily distinguished from *F. splendida* and *F. Albertisii* already by the shape of the leaves, not broader in the lower portion than in the upper, also by the very blunt and short calyx. Some allowance must be made for the imperfectness of the definition, above sketched out, as only specimens in bud are as yet available for examination here. The ternate position of the leaves may not prove a constant characteristic. The form of the leaves bring our plant nearest to *F. Vitiensis*, but they are longer in proportion to breadth, also blunt at the base; the crowded position of the flowers and the size and shape of the calyces are similar; the full difference must be traced out at some future time."

Mrs. Clemens refers to *F. ternifolia* as a "tall vine" with white corollas, and found it in anthesis in August.

The "*Faradaya* prob. *ternifolia*" of Pulle (1911) actually is *F. dimorpha* Pulle.

Citations: NEW GUINEA: Papua: *F. Mueller* s.n. [Strickland River] (Ld—photo of isotype, Mb— isotype, N—photo of isotype). Territory of New Guinea: *M. S. Clemens* 10559j (Mi).

FARADAYA VITIENSIS Seem., Journ. Bot. Lond. 3: 258. 1865.

Synonymy: *Faradaya vitiensis* (A. Gray) Seem. ex Mold., Known Geogr. Distrib. Verbenac., ed. 1, 69 & 92. 1942. *Clerodendron vitiensis* A. Gray, in herb.

Bibliography: Seem., Journ. Bot. Lond. 3: 258. 1865; Seem., Fl. Vit. 190, pl. 44 (1866) and 441. 1873; Horne, Year Fiji 262. 1881; Seem., Descr. Notes Papuan Pl., imp. 1, 8: 48. 1886; Hook. f., Curtis Bot. Mag. 117: pl. 7187. 1891; Drake del Castillo, Illustr. Fl. Ins. Mar. Pacif. 260. 1892; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 946. 1893; H. J. Lam, Verbenac. Malay. Arch. 236. 1919; Stapf, Ind. Lond. 3: 173. 1930; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 69 & 92. 1942; Mold., Phytologia 2: 103. 1945; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 151 & 185. 1949; Mold., Résumé 207 & 455. 1959; Mold., Résumé Suppl. 4: 9. 1962; Mold. in Menninger, Flow. Vines 334. 1970; Mold., Fifth Summ. 1: 343 (1971) and 2: 878. 1971; F. Muell., Descr. Notes Papuan Pl., imp. 2, 8: 48. 1979; Mold., Phytol. Mem. 2: 333 & 548. 1980; Mold., Phytologia 51: 396. 1982.

Illustrations: Seem., Fl. Vit. pl. 44. 1866.

A robust shrub or tree, 5--10 m. tall (*Degener & Ordonez 13619*, *Bryan 612*) or high-climbing liana (*Smith 9199*), glabrous in all its parts; branches thick, glabrous; leaves resembling those of *F. splendida* F. Muell., decussate-opposite or verticillate, the blades oval-oblong or obovate-oblong, 20--25 cm. long (including the petiole), 10--12.5 cm. wide, apically acuminate, marginally entire, basally attenuate into the petiole; cymes corymbose; calyx subbilabiate, glabrous; corolla cream-color, in bud with the lower lobe innermost, the upper lobe outermost and overlapping the two lateral lobes, the tube subinfundibular, 2--3 times as long as the calyx, the lobes oblong, apically obtuse; stamens long-exserted; ovary 4-lobed; infructescences usually borne on the lower part of the main stem (*Smith 9199*); fruit orange to bright red or finally deep-red, succulent.

The species is based on an unnumbered Storck collection from Viti Levu in the Fiji Islands.

The corollas are described as having been "white" on *Bryan 612*, "pure-white" on *Smith 5740 & 9091*, and "cream-white" on *Smith 1717*. The flowers are said to be odorless, the calyx (during anthesis) pure-white or else pale-green and apically whitish, and both the filaments and style pure-white.

Collectors have encountered this plant in thin or dense forests, thickets, and rainforests, at 30--1000 m. altitudes, in flower in May and from September to November, and in fruit in May, November, and December.

Vernacular names reported for it are "wa koro vudi", "wakorovudi", "wa korovundi", and "wa vatu".

The var. *puberulenta* Mold. is now regarded as being synonymous with typical *F. lehuntei* (Horne) A. C. Sm. The A. C. Smith 1717 collection was regarded by Lam as "*Faradaya*, probably sp. nov. cf. *amicorum* (Seem.) Seem."

Material of *F. vitiensis* has been misidentified and distributed

in some herbaria is *F. amicorum* (Seem.) Seem. or *F. ovalifolia* (A. Gray) Seem. On the other hand, the Bryan 341, distributed as *F. vitiensis*, actually is *F. lehuntei* (Horne) A. C. Sm., Degener & Ordóñez 13762 is the type collection of *F. lehuntei* var. *degeneri* (Mold.) Mold., Gillespie 2616, 2979, & 3290, Parks 20386 & 20439, and Setchell & Parks 15018 are *F. ovalifolia* (A. Gray) Seem., and Greenwood 966 is *F. ovalifolia* var. *glabra* Mold.

Citations: FIJI ISLANDS: Ovalau: E. H. Bryan 612 (Bi). Vanua Levu: A. C. Smith 1717 (Bi, Ca--602344, N, S, W--1676293). Viti Levu: Degener & Ordóñez 13619 (A, Bi, N); J. W. Gillespie 2596 (Bi), 3640 (Bi), 3738 (Bi); C. Skottsberg s.n. [Oct. 13, 1938] (Go, Go); A. C. Smith 5740 (W--1966156), 5859 (Bi, N), 9004 (Id), 9091 (Hk, N), 9199 (Hk).

ADDITIONAL NOTES ON THE GENUS *CONGEA*. III

Harold N. Moldenke

CONGEA Roxb.

Additional synonymy: *Congtia* [Roxb.] ex Mold., Phytol. Mem. 2: 395, in syn. 1980.

Additional & emended bibliography: Roxb., Hort. Beng., imp. 1, 46 & [95]. 1814; Endl., Gen. Pl. 1: 638. 1838; Reichenb., Deutsch. Bot. [Repert. Herb. Nom.] 108. 1841; Walp., Repert. Bot. Syst. 4: 116--118 & 134. 1845; Lindl., Veget. Kingd. 664. 1846; A. L. Juss. in Orbigny, Dict. Univ. Hist. Nat. 13: 185. 1849; W. Griff., Notul. Pl. Asiat., imp. 1, 4: 174--175 & 513, pl. 458, fig. 21. 1854; Bocq. in Baill., Rec. Obs. Bot. 3: 180 & 181. 1863; Pfeiffer, Nom. Bot. 1 (1): 64 (1873) and 2 (2): 989, 1570, & 1593. 1874; Kurz, Forest Fl. Brit. Burma 2: 252 & 256. 1877; Durand, Ind. Gen. Phan. 322. 1888; Collett & Hemsl., Journ. Linn. Soc. Lond. Bot. 28: 111. 1890; Baill., Hist. Pl. 11: 93, 94, & 121. 1891; Briq. in Engl. & Prantl., Nat. Pflanzenfam., ed. 1, 4 (3a): 133 & 179--181, fig. 67 G & H. 1895; Post & Kuntze, Lexicon 91 & 689. 1904; F. N. Williams, Bull. Herb. Boiss., ser. 2, 5: 432. 1905; King & Gamble, Journ. Asiat. Soc. Beng. 74 (2 extra): 795, 861, & 864--867. 1908; D. H. Scott in Solered. [transl. Boodle & Fritsch], Syst. Anat. Dicot. 2: 1020 & 1021. 1908; Ridl., Journ. Roy. Asiat. Soc. Straits 59: 158. 1911; Firminger, Man. Gard. India, ed. 6, 2: 389. 1918; J. C. Willis, Dict. Flow. Pl., ed. 5, 169. 1925; Funke, Ann. Jard. Bot. Buitenz. 41: 55. 1930; Navarro Haydon, Flor. Comun. Puerto Rico [12]. 1936; Fletcher, Kew Bull. Misc. Inf. 1938: 208--209, 401, 405--407, 409, & 439--440. 1938; Lemée, Dict. Descrip. Syn. Gen. Pl. Phan. 8b: 657, 995, & 1024. 1943; Metcalfe & Chalk, Anat. Dicot. 2: 1031, 1033, 1035, 1037, 1040, & 1041. 1950; J. C. Willis, Dict. Flow. Pl., ed. 6, 169. 1951; Cor-

ner, Wayside Trees, ed. 2, 695. 1952; Brandis, Indian Trees, imp. 5, 502, 513, & 514. 1971; López-Palacios, Revist. Fac. Farm. Univ. Andes 20: 27. 1979; Fosberg & Renvoize, Fl. Aldabra [Kew Bull. Add. Ser. 7:] 219 & 222--223. 1980; Liu & Yu, Act. Bot. Yunnan. 2: 455 & 456. 1980; Mold., Phytologia 45: 209--216, 270--280, 403, 406, 407, 409, 411, 439--440, 505, 506, & 510 (1980) and 46: 47, 49, 50, 53, 54, 57, 124--127, 132, 133, 156, 157, 159, 160, 167, 506, 507, & 510. 1980; Mold., Phytol. Mem. 2: 5, 80, 93, 95, 97, 107, 219, 260, 270, 272, 275, 278, 285, 288, 290, 292, 296, 307, 314, 352, 394, 395, 409, 436, & 518. 1980; Roxb., Hort. Beng., imp. 2, 46 & [95]. 1980; Geesink, Leeuwenberg, Ridsdale, & Veldkamp, Thonn. Analyt. Key 174 & 178. 1981; Mold., Phytologia 50: 255 & 505. 1982.

CONGEA CHINENSIS Mold.

Additional bibliography: Mold., Phytologia 45: 55, 56, 60, 61, & 273. 1980; Mold., Phytol. Mem. 2: 272, 278, 395, & 518. 1980.

CONGEA CHINENSIS var. *LATIBRACTEATA* Munir

Additional bibliography: Mold., Phytologia 45: 55. 1980; Mold., Phytol. Mem. 2: 272 & 518. 1980.

CONGEA CONNATA Fletcher

Additional bibliography: Mold., Phytologia 45: 55--56 & 60--62. 1980; Mold., Phytol. Mem. 2: 285, 288, & 518. 1980.

CONGEA FORBESII King & Gamble

Additional bibliography: Mold., Phytologia 45: 210 & 275. 1980; Mold., Phytol. Mem. 2: 314 & 518. 1980.

CONGEA FORBESII var. *RIDLEYANA* Munir

Additional bibliography: Mold., Phytologia 45: 57. 1980; Mold., Phytol. Mem. 2: 296, 314, & 518. 1980.

CONGEA GRIFFITHIANA Munir

Additional & emended bibliography: Baill., Hist. Pl. 11: 94. 1891; Fletcher, Kew Bull. Misc. Inf. 1938: 405, 407, 439, & 440. 1938; Brandis, Indian Trees, imp. 5, 513 & 514. 1971; Fosberg & Renvoize, Fl. Aldabra [Kew Bull. Add. Ser. 7:] 222--223. 1980; Mold., Phytol. Mem. 2: 219, 272, 275, 285, 290, 296, 307, 352, & 518. 1980.

CONGEA GRIFFITHIANA var. *ELLIPTICA* Munir

Additional bibliography: Mold., Phytologia 45: 210. 1980; Mold., Phytol. Mem. 2: 272, 395, & 518. 1980.

Congdon encountered this plant in evergreen forests, at 20--200 m. altitude, in flower in December, and distributed it to herbaria as *C. vestita* W. Griff.

Additional citations: THAILAND: *Congdon 358* (Ac).

CONGEA HANSENII Mold.

Additional bibliography: Mold., Phytologia 45: 60. 1980; Mold., Phytol. Mem. 2: 285 & 518. 1980.

CONGEA xMUNIRI Mold.

Additional bibliography: Mold., *Phytologia* 45: 60--61. 1980; Mold., *Phytol. Mem.* 2: 292, 395, & 518. 1980.

CONGEA PEDICELLATA Munir

Additional bibliography: Mold., *Phytologia* 45: 61--62, 211, 216, 274, 276, & 278--280. 1980; Mold., *Phytol. Mem.* 2: 285, 290, 292, 395, & 518. 1980.

CONGEA ROCKI Mold.

Additional bibliography: Mold., *Phytologia* 45: 62 & 273. 1980; Mold., *Phytol. Mem.* 2: 285 & 518. 1980.

CONGEA SIAMENSIS Fletcher

Additional bibliography: Mold., *Phytologia* 45: 210 & 273. 1980; Mold., *Phytol. Mem.* 2: 272, 285, & 518. 1980.

CONGEA TOMENTOSA Roxb.

Additional & emended bibliography: Roxb., *Hort. Beng.*, imp. 1, [95]. 1814; Walp., *Repert. Bot. Syst.* 4: 116 & 117. 1845; Collett & Hemsl., *Journ. Linn. Soc. Lond. Bot.* 28: 111. 1890; Briq. in *Engl. & Prantl, Nat. Pflanzenfam.*, ed. 1, 4 (3a): 179--181, fig. 67 G & H. 1895; D. H. Scott in *Solered.* [transl. Boodle & Fritsch], *Syst. Anat. Dicot.* 2: 1021. 1908; Ridl., *Journ. Roy. Asiat. Soc. Dtraits* 59: 158. 1911; Firminger, *Man. Gard. India*, ed. 6, 2: 389. 1918; Navarro Haydon, *Flor. Comun. Puerto Rico* [12]. 1936; Fletcher, *Kew Bull. Misc. Inf.* 1938: 401, 405, 439, & 440. 1938; Metcalfe & Chalk, *Anat. Dicot.* 2: 1037. 1950; Brandis, *Indian Trees*, imp. 5, 513. 1971; Liu & Yu, *Act. Bot. Yunnan.* 2: 455 & 456. 1980; Mold., *Phytologia* 45: 270--279 (1980) and 46: 132 & 133. 1980; Mold., *Phytol. Mem.* 2: 80, 93, 95, 97, 107, 260, 270, 272, 278, 285, 290, 292, 296, 352, 394, 395, 409, 436, & 518. 1980; Roxb., *Hort. Beng.*, imp. 2, [95]. 1980.

Emended illustrations: Briq. in *Engl. & Prantl, Nat. Pflanzenfam.*, ed. 1, 4 (32): 180, fig. 67 G & H. 1895; Navarro Haydon, *Flor. Comun. Puerto Rico* [12]. 1936.

Recent collectors describe this plant as a woody climber, high-climbing vine, or large scrambler, to 8 m. long, with gray or pinkish bracts, sprawling over trees and shrubs in roadside thickets and in the open near rivers, and have found it at 120--1000 m. altitude, in flower in February and March. D'Arcy describes the corollas as "pale-violet" in color and 2-lipped, with the stamens orange in color and long-exserted.

Kurz (1877) reports for this species the variant vernacular name, "tha-ma-ka-nway", in Burma, and asserts that the plant is "Common in all kinds for forests except the littoral ones, all over Burma from Chittagong to Ava down to Tenasserim", flowering there in December and January. Craib (1911) gives its distribution as "Bengal, Burma, Assam", citing *Hosseus* 370, *Kerr* 533 and *Vanpruk* 163, commenting that "In the length of the calyx teeth these specimens are intermediate between the type and var. *azurea* C. B. Clarke."

Ridley (1911) and Collett & Hemsley (1890) list it from Thailand. Ridley quotes Keith as saying of it: "abounding in big trees in jungle", citing Curtis 2969 as well as unnumbered Aniff and Keith collections.

The *Kiah S.158*, misidentified and distributed as *C. tomentosa*, actually is *C. velutina* Wight

Additional citations: BURMA: *Alsterlund* 4 (Go, Go, Go, Go). THAILAND: *Koyama*, *Phengklai*, *Niyondham*, *Tamura*, *Okada*, & *O'Connor* 15342 (Ac, N). CULTIVATED: Cuba: *Eames s.n.* [March 7, 1948] (It). Missouri: *D'Arcy* 5783 (Ba--383856). Zimbabwe: *J. Scott s.n.* [25.3.1975] (Ba--371737).

CONGEA TOMENTOSA var. *NIVEA* Munir

Additional bibliography: Mold., *Phytologia* 45: 270, 272--276, & 278--280. 1980; Mold., *Phytol. Mem.* 2: 285, 288, 290, 292, 352, 395, & 518. 1980.

Additional citations: THAILAND: *Noor & Munir* 5 (W--2853307--isotype).

CONGEA VELUTINA Wight

Additional & emended bibliography: F. N. Williams, *Bull. Herb. Boiss.*, ser. 2, 5: 432. 1905; Brandis, *Indian Trees*, imp. 5, 513. 1971; Chin, *Gard. Bull. Singapore* 30: 192. 1977; Mold., *Phytologia* 45: 61, 211, 216, 270, 273, 276--279, & 411. 1980; Mold., *Phytol. Mem.* 2: 260, 272, 275, 285, 296, 314, 352, 395, & 518. 1980.

The *Kiah* collection, cited below, was misidentified and distributed as *C. tomentosa* Roxb. and its bracts are described by the collector as having been "silvery-white".

Additional citations: CULTIVATED: New Caledonia: *Déméné s.n.* [McKee 37233] (Ba--386779). Singapore: *Kiah S.158* (Ba--385718).

CONGEA VESTITA W. Griff.

Additional & emended bibliography: Briq. in Engl. & Prantl, *Nat. Pflanzenfam.*, ed. 1, 4 (3a): 181. 1895; Brandis, *Indian Trees*, imp. 5, 513. 1971; Mold., *Phytologia* 45: 279--280. 1980; Mold., *Phytol. Mem.* 2: 272, 275, 285, 292, 296, 352, & 518. 1980.

Additional illustrations: W. Griff., *Notul. Pl. Asiat.*, imp. 1, 4: pl. 458, fig. 21. 1854.

The *Congdon* 358, distributed and misidentified as *C. vestita*, actually is *C. griffithiana* var. *elliptica* Munir.

CONGEA VESTITA var. *SUBVESTITA* Munir

Additional bibliography: Mold., *Phytologia* 45: 279--280. 1980; Mold., *Phytol. Mem.* 2: 292 & 518. 1980.

NOTES ON BROMELIACEAE, XLI

Lyman B. Smith and Robert W. Read

United States National Museum, Washington, D. C., U. S. A.

1. PITCAIRNIOIDEAE

1. PUYA

136a. (formerly No. 161 in Fl. Neotropica key). *P. HAMATA* L. B. Smith, Contr. U. S. Nat. Herb. 29: 315, fig. 35, 1949, emend L. B. Smith & R. W. Read. A descriptione originali bracteis primariis apice reflexis, a *P. isabellina* Mez bractearum sepalorumque marginibus indumento densissimo occultis differt.

ECUADOR: CARCHI: El Angel and vicinity, Paramo de El Angel, "Laguna del Boladero", ca. 3650 m, 12 August 1978, Zarucchi 2350 (ECON, US).

The photo with Zarucchi 2350 for the first time clearly shows reflexed primary and scape-bracts. Photos of collections already cited in Flora Neotropica are blurred but do suggest reflexed primary bracts. Actual specimens are too fragmentary to prove much either way. It would have been much better in the Flora Neotropica key p. 76-77 to have removed the species with primary bracts having margins obscured by the indument before those species with reflexed primary bracts.

137. *P. TRIANAE* Baker.

VENEZUELA: TACHIRA: Paramo El Almorzadero, 3400 m, 14 June 1974, E. Medina s. n. (VEN 97041). New to Venezuela.

3. FOSTERELLA

12b. *F. SCHIDOSPERMA* (Baker) L. B. Smith var. *VESTITA* L. B. Smith & R. W. Read, var. nov. A var. *schidosperma* inflorescentia villosula differt.

INFLORESCENCE villous at least when young.

PERU: PUNO: San Gabon to Ollachea 1000-2000 m, 17-24 July 1978, Dillon, Aronson, Herra & Berry 1253 (holotype, US; isotype MO); below San Gabon on Río San Gabon, 500-1000 m, 17-24 July 1978, 1201 (MO, US).

Unfortunately the key in Flora Neotropica divides the last 6 species of *Fosterella* (p. 200, 202) on the presence or absence of indument on the inflorescence and thus separates the 2 varieties of *F. schidosperma*. We propose the following substitution in the key as more useful and probably more in line with taxonomy:

1. Flowers secund or nutant, usually both.
5. Leaf-blades entire.

8. Floral bracts 5-7 mm long, mostly exceeding the pedicels, attenuate.
9. Scape-bracts densely imbricate; floral bracts much exceeding the pedicels; inflorescence densely villous. Bolivia. 9. F. villosula
9. Scape-bracts shorter than the upper internodes at least; floral bracts scarcely if at all exceeding the pedicels; inflorescence merely arachnoid. Mexico, Guatemala, Salvador. 8. F. micrantha
8. Floral bracts not more than 2 mm long, mostly shorter than the pedicels, apiculate.
10. Leaf-blades 35-40 mm wide, strongly contracted toward base though not petiolate.
11. Flowers 8-9 mm long. Peru to Argentina. 10. F. penduliflora
11. Flowers 5 mm long. Peru, Bolivia. 12. F. schidosperma
10. Leaf-blades 11-20 mm wide; flowers 5-6 mm long.
12. Leaf-blades constricted toward base, 11 mm wide, tomentose-lepidote to glabrous beneath; scape-bracts remote: Bolivia. 13. F. gracilis
12. Leaf-blades not constricted toward base, 20 mm wide, covered beneath with a membrane of pale coalesced scales; scape-bracts nearly or quite equaling the upper internodes. Paraguay. 11. F. rojasii

8. PITCAIRNIA

13a. (46). P. ULEI L. B. Smith, Bol. Mus. Nac. Rio de Janeiro II. no. 15: 5, pl. I, figs. h, i, j. 1952, emend. L. B. Smith & R. W. Read. A descriptione originali scapi bracteis superioribus quam internodiis longioribus vel paulo brevioribus, inflorescentia pauciramosa vel simplicissima, seminibus alatis, a P. killipiana L. B. Smith bracteis florigeris lineari-lanceolatis attenuatis et a P. caricifolia Mart. ex Schult. f. ovario ca. 1/3 supero differt.

BRAZIL: DISTRITO FEDERAL: Damp ground subject to flooding, D. Coelho s. n. (INPA 16703).

30a ? P. LUTEYNIORUM L. B. Smith & R. W. Read, sp. nov. Ob ovula perjuvenilia affinitate haud cognita sed ab omnibus speciebus adhuc cognitis foliis integris haud petiolatis, inflorescentia simplici subdensa, bracteis florigeris late ovatis quam sepalis multo brevioribus, floribus subsessilibus, sepalis oblongis, subtruncatis differt. Pl. 1

PLANT known only from fragments, flowering over 7 dm high. LEAF 85 cm long, entire, obscurely lepidote; sheath narrowly ovate, brown toward base, blade linear, attenuate, 26 mm wide, slightly narrowed below but not petiolate. SCAPE straight, stout, dark (dry); scape-bracts erect, the lower subfoliaceous, imbricate, the highest shorter than the internodes, ovate, acuminate, red with green apex. INFLORESCENCE simple, erect, 4 cm long, subdense, glabrous. FLORAL BRACTS like the upper scape-bracts to 25 mm long, concealing the bases of the flowers;

flowers subsessile. SEPALS oblong, subtruncate, apiculate, ca. 30 mm long, reddish-orange suffused with orange at the tips (! Luteyn); petals ca. 40 mm long, rose-red (! Luteyn), appendaged. OVARY more than half superior; ovules very young but apparently not caudate. Pl. 1.

COLOMBIA: NARIÑO: Municipio Ricaurte, La Planada, ca. 5 km south of Chucunés, Finca of L. Salazar, 1850 m, 24-25 February 1979, James L. Luteyn & Maria Lebrón-Luteyn 6821 (holotype, US; isotypes, COL, NY).

Pitcairnia luteyniorum appears to have non-caudate ovules and thus belongs to subgenus Pepinia but in any case we can find nothing closely related to it.

34a. P. ALVERSONII L. B. Smith & R. W. Read, sp. nov. In clavi Florae Neotropicae cum P. epiphytica L. B. Smith et P. sprucei Baker posita sed foliorum vaginis pallidis, laminis angustioribus, scapo brevissimo, pedicellis brevibus, floribus paucis suberectis differt. Pl. 2.

PLANT caulescent. LEAVES uniform, fasciculate, to 6 dm long, entire; sheaths narrowly ovate, 6-7 cm long, green, soon glabrous; petioles ca. 1.5 mm wide; blades linear-lanceolate, attenuate, 23 mm wide, glabrous above, covered beneath with pale appressed scales. SCAPE erect, slender, almost wholly covered by the leaf-sheaths; scape-bracts subfoliaceous, greatly exceeding the inflorescence. INFLORESCENCE simple, few-flowered, shorter than the petiole. FLORAL BRACTS narrowly ovate, filiform-attenuate, the lower ones much exceeding the remainder of the inflorescence; pedicels slender, terete, 8 mm long, lepidote; flowers suberect. SEPALS lance-oblong, 13 mm long, inflated at base, subacute and mucronate at apex, lepidote, the posterior ones carinate; petals 5 cm long, arching, yellow, naked; stamens included; ovary $\frac{4}{5}$ superior; ovules ecaudate.

COLOMBIA: ANTIOQUIA: On cliff, edge of secondary forest along roadway following river, 0-5 km south of Quebrada La Tirana, tropical wet to very wet forest transition zone (annual rainfall ca. 4400 mm), near Planta Providencia 28 km southwest of Zaragoza, valley of Río Anorí in areas surrounding the confluence of Quebrada La Tirana and Río Anorí, ca. 3 km upriver from Planta Providencia, 400-700 m, 23 March 1977, Alverson, White & Shepherd 250 (holotype, WIS; isotype, US).

195a. (207). P. HITCHCOCKIANA L. B. Smith, *Phytologia* 5: 44, pl. 6, figs. 1-3. 1954; emend. *Phytologia* 41: 331, pl. 5. 1979.

VENEZUELA: TACHIRA: Around Represa Dorada, on sandstone bluff near river, 600-1000 m, 10-13 March 1981, Liesner & González 10409 (MO, VEN, US); ca. 35 km south southeast of San Cristobal, La Buenaña, 7° 28' N, 72° 09' W, 600-1200 m, 20-21 March 1981, Liesner & González 10867 (MO, VEN, US); 10 km (airline) km east southeast of La Fundación, around Represa Dorada, 7° 47' N, 71° 46-47' W, 450-650 m, 29 April 1981, Liesner & Guariglia 11563 (MO, VEN, US). New to Venezuela.

216. P. ABUNDANS L. B. Smith, *Phytologia* 10: 483, pl. 2, figs. 1, 2. 1967.

MEXICO: OAXACA: Municipio Pinotepa Nacional: Cañón del Río de

Arena, 6.5 km al este de Pinotepa Nacional por la carretera a Puerto Escondido, bosque caducifolia sobre una ladera de granito, 50 m alt.; planta cespitosa, rosetiforme, retoños saliendo de la base de la roseta, flores color amarillo pálido; en manchones sobre roca expuesta, comun, 9 Noviembre 1979, S. D. Koch, Fryxell & Wendt 79444 (Herb. Colegio, Chapingo, Mexico, Mexico). First collection since the type. New to Oaxaca and a range extension of over 500 miles or 700 km.

2. TILLANDSIOIDEAE

14. TILLANDSIA

9. T. PYRAMIDATA André, Bromel. Andr. 8. 1889.

BOLIVIA: LA PAZ: Prov. Sud Yungas, Huanacáné 7.5 km to the south on the new road, 10-20° SW, 2410 m, nearly untouched forest, 9 March 1980, St. G. Beck 1980 (LA PAZ, US). New to Bolivia.

41. T. TOVARENSIS Mez, DC., Monogr. Phan. 9: 769. 1896.

BOLIVIA: LA PAZ: Prov. Murillo: Zongo, 10 km toward La Paz, 40° E, 2170 m, evergreen cloud forest with many epiphytes, 7 April 1979, St. G. Beck 1242 (LA PAZ, US). New to Bolivia.

252. T. SETACEA Swartz, Fl. Ind. Occ. 1: 593. 1797.

VENEZUELA: BOLÍVAR: Represa Guri, 1-5 km south of dam, islands and west side of river, forest, epiphytic, 7° 45' N, 63° 00' W, 220-240 m, Liesner & González 11078 (MO). New to Venezuela.

369c. T. SPICULOSA Griseb. var. MICRANTHA (Baker) L. B. Smith.

BOLIVIA: BENI: Prov. Ballivian: Puente Rio Quiquibey, 4 km toward San Borja (coming from P. Linares), 700 m, epiphytic in natural 35 m high forest with many epiphytes, on high terrace of the Rio Quiquibey Valley, 14 July 1979, St. G. Beck 1733 (LA PAZ, US). New to Bolivia.

15. VRIESEA

41. VRIESEA GLADIOLIFLORA (Wendl.) Ant., Wiener Ill. Gart. 5: 98, pl. 1. 1880.

VENEZUELA: TÁCHIRA: 10 km east of La Fundación (13-23 km by road), around Represa Dorada, epiphytic, primary evergreen forest, 600-1000 m alt, 10-13 March 1981, Liesner & González 10318 (US, VEN). New to Venezuela.

PERU: LORETO: Prov. Maynas: lower Río Momón, tributary of Río Nanay, near Iquitos, epiphytic, primary lowland rainforest along the riverbank, 9 December 1979, C. Davidson & Jones 9806 (LAM, US). New to Peru.

125. VRIESEA SPLITGERBERI L. B. Smith & Pittendrigh.

PANAMA: CHIRIQUI: Epiphyte, rainforest, Cerro Horqueta, July 20, 1968, Dwyer & Lollathin 8748 (NY). New to Panama.

127. V. CAPITULIGERA (Grisebach) L. B. Smith & Pittendrigh.

BRAZIL: AMAZONAS: Estrada Manaus-Caracará, km 11, campina do

igarape do Leão, 11 June 1963, W. Rodrigues 5289 (INPA 13957).
New to Brazil.

16. GUZMANIA

44. *G. DONNELL SMITHII* Mez ex Donnell Smith, Bot. Gaz. 35: 9. 1903.

Guzmania donnellsmithii should appear under both of the two first major divisions of the key in Flora Neotropica, the sepals being often more than half connate and their free lobes broadly rounded and cucullate.

1. Sepals high-connate into a slenderly cylindric tube, the free lobes often cucullate or dilated (Sodirosa).

152. Plants stemless, sepals often cucullate.

153. Leaf-blades ligulate.

154. Inflorescence compound; leaf-blades concolorous.

154a. Inflorescence lax; flowers slenderly pedicellate.

115. *G. macropoda*

116. *G. dudleyi*

154a. Inflorescence dense or lax at extreme base; flowers subsessile.

44. *G. donnellsmithii*

105. *G. SQUARROSA* (Mez & Sodiro) L. B. Smith & Pittendrigh, Jour. Washington Acad. 43: 403. 1953.

BOLIVIA: LA PAZ: Prov. Sud Yungas: Huanacáné, 9 km to the south on the new road, 20° E, 2500 m, forest of Podocarpus and Clusia the other side of the crest, epiphytic, 9 March 1980, St. G. Beck 3187 (LA PAZ, US). New to Bolivia.

18. CATOPSIS

5. *CATOPSIS BERTERONIANA* (Schult. f.) Mez. Viscum Caryo-phylloides, Aloes foliis viridibus acuminatis, floribus racemosis luteis Catesby, Carol. 2: pl. 77. 1743. Reference furnished by Richard A. Howard.

3. BROMELIOIDEAE

23a. *PSEUDAECHMEA* L. B. Smith & R. W. Read, gen. nov.

FOLIA rosulata; laminis armatis. SCAPUS elongatus. INFLORESCENTIA simplicissima. BRACTEAE FLORIGERAE florum bases haud cingentes. FLORES longe pedicellati, polystichi, perfecti. SEPALA sublibera, asymmetrica, inermia. PETALA haud appendiculata. STAMINA inclusa; filamentis a petalis inclusis sed distinctis; pollinis granum biporatum. OVARIUM inferum, sine tubo epigyno, placentis subapicalibus, ovulis caudatis.

1. *P. AMBIGUA* L. B. Smith & R. W. Read, sp. nov. PLANTA acaulis, stolonifera, florigera 45-50 cm alta. FOLIA suberecta, 45-48 cm longa, obscure dissiteque albo-lepidota; vaginis ellipticis, ca. 10 cm longis, pallidis; laminis ligulatis, 4-5 cm

latis, laxe serrulatis, pallide canaliculatis. SCAPUS gracilis, erectus, albo-lepidotus; scapi bracteis lanceolatis, attenuatis, integris, superioribus imbricatis. INFLORESCENCIA 8-9 cm longa, laxissima, albo-araneosa. BRACTEAE FLORIGERAE inferioribus eis scapi simulantes, fulgente rubrae, superioribus abrupte valdeque reductis. FLORES divergentes; pedicellis gracillimis, ad 4 cm longis, roseis. SEPALA brevissime connata, oblonga, apice asymmetricice rotundata, 5.5 mm longa, fulgente violaceo-azurea, haud carinata. PETALA immatura solum cognita, sepala aequantia. Pl. 3, 4.

COLOMBIA: ANTIOQUIA: Mun. Zaragosa: Corregimiento de Provi-dencia, trail in advanced humid secondary tropical forest, vicinity of the hydroelectric plant, 500-650 m, 9 February 1971, D. D. Soejarto & J. D. Villa 2703 (ECON, holotype).

In the Flora Neotropica key (part 3, p. 1494), Pseudaechmea comes next to Fernseea, but differs significantly in the asym-metric sepals, total lack of an epigynous tube above the ovary, caudate ovules, and biporate pollen grains.

29. GREIGIA

22. G. COLUMBIANA L. B. Smith, Contr. Gray Herb. 98: 7, pl. 1, fig. 7, 8. 1932.

VENEZUELA: TÁCHIRA: Paramo El Amorzadero, 3400 m, E. Medina s. n. (VEN). New to Venezuela.

31. BROMELIA

42. BROMELIA SCARLATINA (hortus ex Henrincq) E. Morren.

PERU: LORETO: Maynas: Rio Ampiyacu, Pebas, trail to Pijuyal, ca. 3° 10' S, 71° 49' W, rosette herb in forest, fruits dark yellow-ochre, shiny, 26 April 1977, T. Plowman, R. E. Schultes & Q. Tovar 7032 (F, GH, USM); same, cultivated and flowered, University of Chicago, 22 October 1979, T. Plowman 7960 (F) and also at SEL.

Thanks to Plowman for bringing this collection to our atten-tion we are now able to record a definite locality for this species first described in 1869 and with no indication of its origin.

FLORA NEOTROPICA, Monograph No. 14.
L. B. Smith & R. J. Downs. Errata 2:

With the completion of the other two parts it is now possible to note errata for the whole monograph. References are being compiled for a supplement and it is planned to include a full list of errata:

Part 1. Pitcairnioideae:

P. 193. Encholirium magalhaesii line 7 of description insert "usually" before "exceeding" because of:

MINAS GERAIS: Mun. Datas: Serra do Espinhaço, alt. ca. 1250 m, 5 Feb 1972, Anderson, Stieber & Kirkbride 35558 (IAN, NY, UB, US).

P. 394. Pitcairnia bakeri (André) André. Delete S. Vogel 26 and enter under P. barrigae L. B. Smith p. 388.

Part 2. Tillandsioideae.

P. 846. Tillandsia umbellata. "Type . . . May 1882."

P. 960. no. 293. Tillandsia variabilis Schlechtendal, Linnaea 18: 418. 1845, replaces T. valenzuelana A. Richard in Sagra, Hist. Cuba 11: 267. 1850.

Tillandsia azurea sensu Schlechtendal & Chamisso, Linnaea 6: 52. 1831, non Presl, 1827.

Type: Schiede 1003 (HAL, photo W. Weber), Papantla, Vera Cruz, Mexico, 29 Jan (1829 ?).

We are indebted to Wilhelm Weber, German Democratic Republic, for photographs giving the above information. The day and month are indicated on the label but not the year. Mez has annotated the specimen as T. valenzuelana A. Rich., yet has disregarded an adequate description of T. variabilis and placed the latter in the doubtful list in his two monographs.

P. 968, no. 304. Tillandsia limbata Schlechtendal, Linnaea 18: 419. 1845 replaces T. dasyliriifolia Baker, Jour. Bot. London 25: 304. 1887.

Type: Schiede s. n. (HAL, photo W. Weber), Hacienda La Laguna, Vera Cruz, Mexico, Aug 1828.

Cf. W. Weber, Jour. Brom. Soc. 31 (5): 223. 1981.

P. 977, no. 311. Delete Tillandsia limbata Schlechtendal from the synonymy of T. flexuosa Sw.

P. 981, no. 316. Tillandsia streptophylla Scheidweiler ex Morren, Hortic. Belge 3: 252, pl. 1836.

Tillandsia circinnata Schlechtendal, Linnaea 18: 430. 1845. Type. Schiede s. n. (holotype HAL, photo W. Weber), Hacienda de La Laguna, Vera Cruz, Mexico.

Cf. W. Weber, Jour. Brom. Soc. 32 (1): 28. 1982.

P. 996, no. 325. Tillandsia paucifolia Baker, Gard. Chron. II. 10: 748. 1878 replaces T. circinnata sensu Mez in DC. Mon. Phan. 9: 722. 1896, non Schlechtendal, 1845.

Type. Cultivated plant of unknown origin, Kew Hortus s. n. (K, GH photo), Oct 1878.

P. 1003, no. 333. Tillandsia erubescens Schlechtendal, Linnaea 18: 427. 1845 replaces T. benthamiana Klotzsch ex Baker, Jour. Bot. London 26: 15. 1888.

Type. Schiede s. n. (HAL, photo W. Weber), San Angel, San Bartolo, Mexico.

Cf. W. Weber, Jour. Brom. Soc. 31 (4): 173. 1981.

P. 1062, no. 399a. Tillandsia parviflora var. parviflora.

Type. Ruiz & Pavon s. n. (MA? n.v.), in woods on rocks, Muña, Huanuco, Peru.

P. 1067. Tillandsia erubescens replaces T. benthamiana, cf. note on p. 1003.

P. 1068. Tillandsia variabilis replaces T. valenzuelana, cf. note on p. 960.

P. 1076, line 2. monacorum

P. 1084, line 3. Inflorescence

P. 1086, first 12. Flowers more than 2 in the axil of the lowest primary bract.

P. 1098, line 2. Fig. 351. F-H.

P. 1163, no. 113. *Vriesea limae* L. B. Smith

Type. A. Lima 65-4276 (IPA type, US), half-bare gneiss hill, Propriedade (Estate) Bituri, Brejo da Madre de Deus, 8° 11' S, 36° 30' W, Pernambuco, Brazil, 5 Feb 1965.

P. 1280, first 79. acuminate, not acuminate.

P. 1281, first 93. morreniana

P. 1283, second 139. *Guzmania spectabilis*, *Phytologia* 40: 55. 1978.

Part 3. Bromelioideae.

P. 1536, first 43. (10-25-) flowered.

P. 1541, no. 5. after *Nidularium myrmecophilum*, forma angustifolium Ule, forma latifolium Ule, *ibid.*

P. 1606, second 18. add "or long narrowly acute."

P. 1650, first 5. Inflorescence long or

P. 1725. Delete Hybrid and subsequent data.

P. 1770. at anthesis.

P. 1778, first 5. Sepals 25-38 mm long.

P. 1826, no. 51a, last synonym. *Gravisia aquilega* (Salisbury) Mez, *Mart. Fl. Bras.* 3 (3): 300. 1892.

P. 1880, no. 104a. *Aechmea comata* Baker, *Jour. Bot. London* 17: 234. 1879.

P. 1880. *Aechmea comata* var. comata L. B. Smith, *Smithson. Misc. Collect.* 126: 221. 1955.

P. 1880, no. 104b. *Aechmea comata* var. makoyana L. B. Smith, *Smithson. Misc. Collect.* 126: 14. 1955.

P. 2064. X *Orthotanthus* 'What' J. D. Garretson, *Jour. Bromel. Soc.* 24: 26. 1974 = *Cryptanthus* 'It' X *Orthophytum saxicola* var. rubra.

P. 2093. comata 35, 1880.

P. 2096. *Agallostachys lanigera* 1666.

P. 2118. X *Orthotanthus*. Delete 1725 and replace with 1709.

P. 2118. Delete *Orthotanthus* X 'What' 1725 and replace with X *Orthotanthus* 'What' 1709.

Plate 1



N. Y. P. 1982

2857236

NATIONAL HERBARIUM

Pitcairnia luteyniorum Smith & Read

Plate 2

*Pitcairnia alversonii* Smith & Read

Plate 3



Pseudaechmea ambigua Smith & Read (holotype)

Plate 4



Pseudaechmea ambigua Smith & Read (isotype)

CERTAMEN MELASTOMATACEIS XXXV.

John J. Wurdack
U. S. National Herbarium, Smithsonian Institution

Except for minor divertissements elsewhere in South America, these notes constitute an interim supplement to the Flora of Ecuador. In addition to the novelties described below, the following species have now been recorded: Meriania pichinchensis Wurdack; Miconia brachycalyx Triana (Cotopaxi: Tenafuerste, Río Pilaló, elev. 750-1300 m, Dodson & Gentry 12727); Miconia impetiolaris (Sw.) Don ex DC. (Los Rios: Jauneche forest, Canton Vinces between Mocache and Palenque, elev. 70-100 m, Dodson et al 6948, 8760, and 9802), contradicting my demurral in the Flora; Clidemia calcarata Cogn. & Gl. ex Gleason (Napó: Baeza-Tena road, south slope of Cordillera de Guacamayos above Jondachi, elev. 1500 m, Harling & Andersson 16351); Clidemia garciabarrigae Wurdack (Carchi: El Pailon ca 45 km below Maldonado, elev. 800 m, Madison & Besse 7093); Ossaea bracteata Triana (Carchi: El Pailon ca 45 km below Maldonado, elev. 800 m, Madison & Besse 7013 and 7014); Ossaea rubescens (Triana) Cogn. (Carchi: El Pailon ca 45 km below Maldonado, elev. 800 m, Madison & Besse 6996); Blakea polyantha Wurdack; Topobea caudata Wurdack; Topobea modica Wurdack; and Alloneuron ecuadorensis Wurdack. Of course, there are also many new Province records for species previously known from Ecuador. Gilli (Feddes Repert. 92: 681-683. 1981) has published a list of his own Melastomataceae collections from Ecuador. I have not seen this material, but Miconia corazonica Gilli is a homonym and should be compared with M. asclepiadea Triana, while M. onychocalyx Gilli should be evaluated with the pleiostemonous element of M. crocea (Desr.) Naud.

LEANDRA CANDELABRUM (Macbride) Wurdack, comb. nov.

Graffenrieda candelabrum Macbride, Field Mus. Publ. Bot. 13(4): 321. 1941.

The misplacement of this species has long been known, but the proper generic disposition in the Miconieae has been elusive. In floral morphology, probably the closest relatives are L. aristigera (Naud.) Cogn., L. boissieriana Cogn., and L. lasiopetala Cogn., all with more developed vegetative pubescence, densely glandular-setulose hypanthia, and exappendiculate stamens. The petals in L. candelabrum externally have a subapical tooth projecting 0.3 mm as well as a few minute glands; the torus within is moderately glandular (0.05-0.1 mm); the 3-celled ovary is 1/2 inferior, with a moderately fine-setulose collar 0.6 mm long; and the baccate fruit is terete. While vegetatively somewhat suggesting Miconia lamprophylla Triana and M. procumbens (Gleason) Wurdack, L. candelabrum differs in basic inflorescence pattern and floral details (petals, ovary). The species range

now includes Venezuela (Amazonas: Liesner 3831 and 6556), Colombia (Amazonas: Schultes & Cabrera 15728), Peru (Amazonas: Huashikat 1414; Loreto), and Brazil (Amazonas: Prance 20746 and 22909). Certainly eastern lowland Ecuador will eventually be included in the distribution.

MICONIA PHAEOCHAETA Wurdack, sp. nov.

M. aureoidi Cogn. affinis, ramulorum foliorum subtus venarum primariarum inflorescentiarumque pubescentia longiore differt.

Ramuli teretes sicut petioli laminarum subtus venae primariae inflorescentiaeque dense pilis pinoideis (eminentiis ca 0.3 mm longis) 0.3-0.5(-0.8) mm longis furfuracei. Petioli 0.7-1.5 cm longi; lamina 10-23 X 4-7.5 cm elliptica vel anguste ovata apice gradatim acuminato basi obtusa, subcoriacea et crenulato-serrulata, supra glabra, subtus in venulis superficieque sparse pilis stellulato-pinoideis 0.2-0.4 mm diam. puberula, 5-nervata (pari tenui inframarginali incluso) nervis secundariis ca 4-5 mm inter se distantibus nervulis subtus planis obscuris areolis ca 1-1.5 mm latis. Panicula 8-10 cm longa submultiflora; flores 5-meri sessiles, bracteolis 2-2.5 X 1.5 mm ovatis deciduis. Hypanthium (ad torum) ca 2.7 mm longum dense pilis stellulato-pinoideis indutum; calycis tubus ca 1.1 mm longus, lobis interioribus ca 1 mm longis deltoideis intus dense strigulosus (pilis pinoideis), dentibus exterioribus obscuris; torus intus sparse glandulosus (0.1 mm). Petala extus dense granuloso-pruinosa 6-6.2 X 2.3-2.5 mm obovato-oblonga. Stamina dimorphica, filamentis 6.3-6.5 mm vel 4.7-4.8 mm longis modice glanduloso-puberulis (0.2 mm), thecis subulatis, poro 0.15 mm diam. Stamina maiora: thecae 4.3 X 0.6 X 0.6 mm, poro ventraliter inclinato; connectivum ad basim incrassatum 0.8 mm altum glandulis 2-3 in quoque lobo ornatum. Stamina minora: thecae 4 X 0.8 X 0.7 mm, poro dorsaliter inclinato; connectivo ad basim paulo incrassatum eglandulosum vel ventraliter glandula minuta obscura munitum. Stigma expansum 1 mm diam.; stylus 8 X 0.5-0.6 mm modice glanduloso-puberulus; ovarium 5-loculare ca 2/3 inferum, cono sparse glanduloso (0.1 mm).

Type Collection: G. Harling & L. Andersson 16581 (holotype GB; isotype US), collected on the Lago Agrio-El Conejo road between Lago Agrio and Proyecto San Miguel, Prov. Napo, Ecuador, elev. ca 300 m, 16 Feb. 1980. "Shrub 1 m high. Corolla yellowish green, stamens white."

Paratype: Willmar Schwabe 73/163 (US), from near Río Pepino about 15 km from Mocoa, Putumayo, Colombia, 13 Feb. 1973.

Miconia aureoides (see description in Flora of Ecuador 13: 132. 1980) has cauline, foliar, inflorescence, and hypanthial hairs only 0.1(-0.2) mm long with very minute enations; usually the connective glands in the small stamens are obvious. *Miconia mazanana* Macbride has paleaceous hairs at the branchlet nodes and pedicellate flowers with minute hypanthial pubescence. Both *M. muricata* (Don) Triana and *M. glandulifera* Cogn. (Phytologia 48: 241. 1981) seem more distantly related.

MICONIA SETICAULIS Wurdack, sp. nov.

M. pujanae Mgf. affinis, floribus 5-meris paulo minoribus, hypanthiis modice pilis stipitato-stellatis indutis differt.

Ramuli teretes sicut petioli densiuscule pilis stipitato-stellatis (stipite plerumque 2-2.5 mm longo, radiis paucis ca 0.3 mm longis) setosi. Petioli 1-2 cm longi; lamina (9-)12-20 X (4-)6-8 cm elliptica apice hebeti-acuto vel paullulo hebeti-acuminato basi rotundata, tenuis et distanter undulato-serrulata, supra et ad margines primum pilis stipitato-stellatis (stipite 0.3-0.5 mm longo) demum deciduis et pilis simplicibus laevibus 0.5-1 mm longis subpersistentibus sparse induta, subtus in venis primariis pilis stipitato-stellatis (stipite ca 1 mm longo) modice setulosa in venis secundariis venulisque pilis stipitato-stellatis (stipite plerumque 0.3-0.5 mm longo) sparse puberula, 3-5-nervata vel paulo (usque ad 1 cm) pseudoplinervata nervis secundariis ca 5-7 mm inter se distantibus nervulis subobscuris areolis 1-2 mm latis. Panícula 2-4 cm longa submultiflora; flores 5-meri sessiles, bracteolis ca 2 X 0.35 mm setulosis. Hypanthium (ad torum) 1.3 mm longum modice setulosum (stipite ca 0.5 mm longo); calyx tenuis in alabastris clausus demum subirregulariter dehiscens ca 0.5 mm longus; torus intus modice glanduloso-puberulus (0.1 mm). Petala 1.2 X 0.5-0.6 mm obovato-oblonga glabra. Filamenta 0.8-1 mm longa glabra; thecae 0.7-0.8 X 0.15 mm oblongae, poro 0.1 mm diam. paullulo dorsaliter inclinato; connectivum non prolongatum, dente dorsali descendenti 0.25-0.3 X 0.2 mm rotundato-truncato. Stigma non expansum; stylus glaber; ovarium 1/2 inferum, apice setuloso.

Type Collection: G. Harling & L. Andersson 17633 (holotype GB; isotype US), collected in virgin rain forest, Finca El Valle de Muerte, Río Curaray ca 10 km east of Curaray (Jesus Pitishka), Prov. Pastaza, Ecuador, elev. 200 m, 22 March 1980. "Shrub ca 2 m high. Corolla white. Ovary violet."

Miconia pujana has rather similar (but somewhat shorter) coarse cauline hairs, but 4-merous flowers and hypanthia nearly esetulose. All of the 5-merous species in this alliance have fine cauline and foliar pubescence and much larger flowers, the closest to *M. seticaulis* perhaps being *M. dorsiloba* Gleason and *M. duckei* Cogn.

MICONIA FILAMENTOSA Gleason subsp. CAQUETANA Wurdack, subsp. nov.

Floribus maioribus calycis dentibus exterioribus eminentibus differt.

Type Collection: J. Cuatrecasas & T. Soderstrom 27146 (holotype US 2596189), collected at San Luis near Quebrada de Miramar, left bank of Río Ortegua, Caquetá, Colombia, elev. 340 m, 16 January 1969. "Arbol 4 m. Hoja verde. Flores blancas."

Paratype: E. L. Little & R. R. Little 9742 (US), from Río Caquetá across from Solano, 8 km SE of Tres Esquinas below mouth of Río Ortegua, Putumayo, Colombia, elev. 200 m, 10 March 1945. "Small tree 6 m high, 5 cm DBH. Bark gray, smooth, trunk angled. Fls. white."

The typical Loreto (Peru) population of M. filamentosa has petals 2.7-3 X 1-1.2 mm (rather than 3.5-3.6 X 1.4-1.6 mm), large anthers 2.4-2.5 mm long (rather than 2.8-3 mm), small anthers 1.8-2 mm long (rather than 2.4-2.5 mm), hypanthium plus calyx tube ca 1.7 mm long (rather than 2.4 mm), and inframarginal external calyx teeth (rather than ca 0.2-0.3 mm emergent). The floral dimensions given in the original description of M. filamentosa are larger than seen by me on Klug 938 (US).

MICONIA CONFORMIS Wurdack, sp. nov.

Sect. Miconia. M. cazaletii Wurdack affinis, foliis floribusque minoribus differt.

Ramuli teretes sicut folia novella inflorescentia hypanthiaque obscure furfuracei (indumento amorpho) glabrati; linea interpetiolaris obscure evoluta. Petioli ca 1 cm longi; lamina 7-11 X 2.5-4.5 cm elliptica apice gradatim per 1-1.5 cm hebeti-acuminato basi acuta et in petiolem anguste decurrenti, chartacea et integra, breviter (ca 5 mm) triplinervata nervis secundariis ca 5 mm inter se distantibus nervulis obscuris laxe (0.5-1 mm) reticulatis. Panicula 9-10 cm longa submultiflora, ramulis primariis 2-4 in quoque nodo; flores 5-meri, pedicellis plerumque 1-2 mm longis et ca 0.2 mm infra hypanthia articulatis, bracteis 0.3-0.5 mm longis angustis subpersistentibus. Hypanthium (ad torum) 1.8 mm longum; calycis tubus 0.2 mm longus, lobis interioribus 0.3 mm longis deltoideis granulosis, dentibus exterioribus obscuris non eminentibus; torus intus glaber. Petala 1.6-1.7 X 0.8 mm obovato-oblonga (apice rotundato-truncato) granulosa apicem versus minute fimbriato-ciliolata. Stamina dimorpha glabra; filamenta 1.5 mm longa, thecis lanceatis, poro 0.1 mm diam., connectivo non vel vix prolongato. Stamina maiora: thecae 1.9 X 0.3 X 0.4 mm, poro ventraliter inclinato; connectivum ad basim appendice cordiformi 0.4 X 0.4-0.5 mm armatum. Stamina minora: thecae 1.5 X 0.3 X 0.4 mm, poro dorsaliter inclinato; connectivum ad basim acute ca 0.2 mm trilobulatum. Stigma paulo expansum 0.3 mm diam.; stylus 5-5.5 X 0.25 mm glaber; ovarium 3-loculare et ca 1/2 inferum, apice granuloso.

Type Collection: J. Jaramillo & F. Coello 3527 (holotype AAU), collected in tropical rain forest north of Tonampari (Worani-Auca village), Prov. Pastaza, Ecuador, elev. 400-500 m, 14 August 1980. "Arbusto de 4 m, estambres blancos, anteras cafés, flores en botón rosadas."

The suggested relative has leaf blades mostly 20-32 X 6-11 cm, subsessile flowers, petals 3 X 1.5-1.7 mm, and anther thecae 2.6-3 mm or 2-2.3 mm long. More distantly related perhaps is M. oligantha Wurdack. The vegetative aspect of M. conformis is rather like that of M. filamentosa Gleason (with short pinoid hairs on the stems, primary leaf veins beneath, and inflorescences, as well as larger flowers) and M. emendata Wurdack (with smaller inflorescences and quite different flowers).

MICONIA PILALOENSIS Wurdack, sp. nov.

Sect. Amblyarrhena. M. pichinchensi Benth. affinis, floribus

maioribus hypanthiis dense glanduloso-setulosis differt.

Ramuli primum obtuse quadrangulati demum teretes sicut petioli laminarum subtus venae primariae inflorescentiaeque pilis asperis 0.1-0.7 mm longis erectis vel incurvis modice vel dense indutis. Petioli 0.5-0.7 cm longi; lamina 4-7 X 2-4 cm ovato-oblonga apice hebeti-acuto basi 0.2-0.4 cm subcordata, chartacea et subcrenulata distanter appresso-ciliolata (pilis laevibus 0.3-0.5 mm longis), supra glabra vel marginem versus sparsissime strigulosa (pilis conicis ca 0.2 mm longis), subtus in venis secundariis venulisque sparse vel sparsissime setulosa pilis laevibus 0.3-0.6 mm longis, 5-7-nervata nervis secundariis ca 3 mm inter se distantibus nervulis subtus laxe reticulatis areolis plerumque 0.7-1 mm latis. Panicula 6-11 cm longa pauciflora, ramulis oppositis sicut hypanthiis dense glanduloso-setulosis pilis ca 0.5-1.4 mm longis; pedicelli 0.7-2 mm longi crassi, bracteolis ca 1.5 mm longis angustis. Hypanthium (ad torum) 3-3.5 mm longum; calycis tubus 0.6-1 mm longus, lobis interioribus 0.2-0.4 mm longis remotis, dentibus exterioribus crassis non eminentibus; torus intus sparse vel sparsissime glandulosus (0.05-0.1 mm). Petala plerumque 4-5 X 4-4.5 mm obovato-suborbicularia glabra. Stamina isomorphica; filamenta 3-5 mm longa sparse glanduloso-puberula (0.1 mm); antherarum thecae 3-3.5 X 0.7-0.9 X 0.9-1.1 mm oblongae, poro 0.15-0.25 mm diam. terminali vel paullulo ventraliter inclinato; connectivum non prolongatum dorsaliter ad basim exappendiculatum ventraliter 0.2-0.3 mm bilobulatum. Stigma expansum 0.6-0.8 mm diam.; stylus 8-9.5 X 0.3-0.5 mm modice glanduloso-puberulus (0.2 mm); ovarium 5-loculare et 1/3-1/2 inferum, collo 0.3-0.5 mm longo sparse glanduloso.

Type Collection: B. Lojtnant, A. & U. Molau 13947 (holotype AAU; isotype GB), collected in cloud forest along Latacunga-Quevedo road 3-5 km above Pilaló, Prov. Cotopaxi, Ecuador, elev. 2700-2800 m, 28 May 1979. "Subshrub ca 1 m tall. Petals white. Stamens yellow."

Paratype: L. Holm-Nielsen & S. Jeppesen 1114 (AAU, US), from near Pilaló, Cotopaxi, Ecuador, elev. 2400 m. "Bush. Flowers redly tarnished or white."

Miconia pichinchensis has only eglandular hairs on the inflorescences and hypanthia, as well as smaller flowers; the salient differences were listed in the Flora of Ecuador (13: 220), the additional material strengthening the specific status. Colombian relatives include those listed in the original descriptions of M. cordifolia Wurdack and M. luteynii Wurdack.

MICONIA PROTUBERANS Wurdack, sp. nov.

Sect. Amblyarrhena. M. barbeyanae Cogn. affinis, petiolorum insertionibus elevatis laminis ad basim rotundatis hypanthiis basaliter pilis stellulato-pinoideis indutis differt.

Ramulis primum rotundato-quadrangulati demum teretes sicut petioli inflorescentiaeque dense et laminarum subtus venae primariae hypanthiaeque (basim versus) modice vel sparsiuscule pilis stellulato-pinoideis 0.05-0.1 mm latis puberuli et glandulis

clavatis 0.05 mm longis induti demum glabrati. Petioli 1.5-2 cm longi in ramulorum zona 1-2 mm elevata inserti; lamina 9-13 X (4-)5-9 cm elliptico-ovata apice abrupte per 1-1.5 cm hebeti-acuminato basi rotundato-truncato vel obscure cordulata, coriacea et integra, utrinque in superficie glabra, 5-nervata vel usque ad 5 mm pseudoplinervata nervis secundariis 2-3(-5) mm inter se distantibus nervulis subtus obscuris areolis ca. 0.3 mm latis. Panícula 6-18 cm longa multiflora; flores 5-meri, pedicellis ca 2 mm longis ad hypanthii bases articulatis, bracteolis ca 0.5 X 0.1 mm linearibus caducis. Hypanthium (ad torum) 2mm longum; calycis tubus 0.2 mm longus, lobis interioribus 0.6 mm longis ovatis ad basim remotis, dentibus exterioribus lobos interiores aequantibus vel paullulo (0.2 mm) excurrentibus; torus intus glaber. Petala 2 X 1.5-1.6 mm obovato-rotundata glabra. Stamina isomorphica glabra; filamenta 2.3-2.5 mm longa; antherarum thecae 1.8-2 X 0.5 X 0.5 mm oblongae, poro 0.1 mm diam. vix dorsaliter inclinato, connectivo simplici non prolongato. Stigma expansum 0.6-0.7 mm diam.; stylus 6.5 X 0.3 mm glaber in ovarii apicem lobulatum 0.3 mm immersus; ovarium 5-loculare et ca 1/4-1/3 inferum lobulis apicalibus sparse glanduloso-setulosis (0.1 mm).

Type Collection: G. Harling & L. Andersson 16433 (holotype GB; isotype US), collected in primary montane rain forest on Baeza-Tena road on southern slopes of Cordillera de Guacamayos, Prov. Napo, Ecuador, elev. ca 1800 m, 9 February 1980. "Liane-like climbing shrub. Corolla white, anthers yellow."

Miconia barbeyana has the petiolar insertion regions of the branchlets not elevated, distinctly plinerved leaf blades acute at the base, an indiscrete (squamulose) indument, and smaller anthers. The tumid nodes, anthers, and ovary apex shape in M. protuberans are rather like those in M. annulata (Naud.) Triana, which has minutely denticulate leaf blades with very lax venule areoles, larger flowers (hypanthium 3 mm long) with inframarginal external calyx teeth, and a glabrous ovary cone. While the recently described M. coloradensis Almeda has callused petiole insertions and similar leaf shape, I do not believe that it is intimately related to M. protuberans (larger well-defined vegetative hairs, apically setulose petioles, 9-11-nerved leaf blades, larger flowers with the hypanthial torus glandular-setulose within); a second collection of the Panama species is Mendoza, Mendieta, & Mayo 291 (US), from Campamento del Bijao in Fortuna, Prov. Chiriquí.

MICONIA ANDERSSONII Wurdack, sp. nov.

Sect. Amblyarrhena. De affinitate intima mihi incognita. In foliorum venatione et ramulorum nodis M. fosbergii Wurdack simile, sed ob indumentum antherasque differt.

Ramuli primum obtuse quadrangulati mox teretes primum (praecipue ad nodos) sicut foliorum subtus venae primariae densiuscule pilis 0.2-0.7 mm longis apicem versus sparse barbelatis setulosi et sicut inflorescentia hypanthiaque dense subamorpho-furfuracei; nodi circa petiolorum insertionem ca 1 mm

elevati, linea interpetiolaris tenui evoluta. Petioli 2-3.5 cm longi; lamina (12-)15-30 X (4-)6-11.5 cm elliptica apice subgraciatim per 1-2 cm hebeti-acuminato basi acuta, chartacea et obscure undulato-denticulata, ubique primum stellulato-furfuracea, supra mox glabrata, subtus demum in superficie glabra in venis secundariis venulisque glanduloso, 5-plinervata pari interiore 1-2.5 cm supra basin divergenti nervis secundariis 3-4 mm inter se distantibus nervulis subtus dense reticulatis areolis 0.2-0.3 mm latis. Panicula 15-22 cm longa multiflora; flores 5-meri, pedicellis 0.5-1 mm longis, bracteolis ca 2 X 1 mm deciduis. Hypanthium (ad torum) 2 mm longum; calycis tubus 0.5 mm longus, lobis interioribus 0.2 mm longis remotis, dentibus exterioribus furfuraceo-setulosis lobos interiores aequantibus vel paullulo superantibus; torus intus glaber. Petala 4.3-4.5 X 1.6-1.9 mm oblonga glabra. Stamina isomorphica; filamenta 2.1-2.2 mm longa apicaliter sparse glanduloso-puberula (0.05-0.1 mm); antherarum thecae 2.1 X 0.6 X 0.4 mm oblongae, poro 0.15 mm diam. dorsaliter inclinato; connectivum non prolongatum, dorsaliter ad basin dente hebeti descendentem 0.2-0.3 X 0.3-0.4 mm armatum. Stigma expansum 0.7 mm diam.; stylus 4.5 X 0.3-0.5 mm basin versus modice glanduloso-puberulus in ovarii collo 0.2 mm immersus; ovarium 3-loculare et 1/3 inferum, apice sparse glanduloso-granuloso (0.05 mm).

Type Collection: G. Harling & L. Andersson 19235 (holotype US 2951978; isotype GB), collected along trail from El Corazón to Facundo Vela 1-3 km south of El Corazón, Prov. Cotopaxi, Ecuador, elev. 1300-1400 m, 17 May 1980. "Shrub ca 3 m high. Corolla white to very pale pink."

Paratypes (both Ecuador): Harling & Andersson 19238 (GB), topotypical ("Shrub ca 2 m. Corolla pink."); A. S. Hitchcock 21188 (US), La Chorita-Portovelo (Gold Mine near Zaruma), Prov. El Oro, elev. 1000-2000 m ("Shrub 10-15 ft.").

Miconia fosbergii has similar annulate-incrassate branchlet nodes and large plinerved leaf blades, but long penicillate-stellate branchlet hairs as well as well-formed short stellulate pubescence, laxly reticulate leaf venules, hypanthial torus glandular-ciliolate within, shorter petals, and spatulate introrsely bipored anthers. Miconia rivetii Dang. & Cherm. is even more distantly related. All the Miconia species in Sect. Amblyarrhena have been canvassed, without really locating a close relative for M. anderssonii; the general vegetative aspect, but not the flowers, is rather like that of some species of Ossaea Sect. Octopleura.

TOCOCA LANCIFOLIA Triana var. ANAPHYSICA Wurdack, var. nov.

Foliis omnibus sine formicariis differt.

Type Collection: Pedro Pinate & Edgardo Mondolfi 1034 (holotype US 2952367; isotype VEN), collected along the middle and upper Río Atacavi, Terr. Amazonas, Venezuela, elev. ca 100 m, 10-24 Nov. 1980. "Arbusto muy ramificado do aproximadamente 3 m."

In the typical variety, large formicaria are developed in

one or both members of each leaf pair. Other than this rather startling difference, the two varieties are alike vegetatively and in floral details. Because of the complete lack of domatia, var. anaphysca would key to near T. lasiostyla Cogn., with densely ciliolate-serrulate leaf blades rounded (rather than acute) at the base, densely pruinose-granulose petals, anthers with a dorsally inclined pore, moderately setulose style, and completely inferior ovary. All of the material (four sheets) of Pinate & Mondolfi 1034 has been available for study. As has been indicated in the past, formicarial development in the Melastomataceae seems genetically determined. During the course of growing Melastomataceae from seed for chromosome counts (Phytologia 47: 199-220. 1980), small domatia usually appeared in the sixth to eighth leaf pair of a seedling in Tococa guianensis Aublet, Maieta guianensis Aublet, and M. poeppigii Mart. ex Triana, with subsequent formicaria becoming larger; the first-mentioned was grown to flowering size (Wurdack 2566) without benefit of ants.

BLAKEA HARLINGII Wurdack, sp. nov.

B. truncatae Gleason affinis, foliis oblongo-ellipticis basaliter nervatis floribus minoribus petalis obtusis differt.

Ramuli teretes primum sicut folia novella obscure furfuracei mox glabrati. Petioli 1-2.5 cm longi; lamina (8-)10-17 X (2.5-)4-6.5 cm oblongo-elliptica apice subabrupte per 0.5-1.5 cm acuminato basi late acuta vel anguste obtusa, coriacea et integra, subtus in nervorum primariorum axillis obscure caduceque barbellata, 3-nervata (pari exteriori tenui inframarginali neglecto) nervis secundariis ca 1 mm inter se distantibus. Flores in quoque nodo superiore plerumque 4, pedicellis 2.5-3 cm longis; bracteae firmae glabrae; bracteae exteriores 19 X 13 mm anguste ovatae acutae extus carinatae ad basim per ca 4 mm coalitae; bracteae interiores 16 X 13 mm obtusae liberae. Hypanthium (ad torum) 8 mm longum glabrum; calycis tubus 4 mm longus, lobis 1.5-1.7 mm longis oblatis; torus intus glaber. Petala 16 X 13 mm obovata (apice obtuso) apicem versus obscure caduceque retrorso-ciliata alioqui glabra. Filamenta ca 7.3 mm longa; antherae 5.2 X 3.5 (connectivo incluso) X 2.2 mm ovatae ut videtur inter se non cohaerentes subapicaliter minute biporosae; connectivi dens dorsalis 2.5 mm longus hebes. Stigma non expansum; stylus 13 X 0.8-0.3 mm glaber; ovarium 6-loculare et 6 mm inferum, cono apicali 2 mm longo angusto glabro.

Type Collection: G. Harling & L. Andersson 16427 (holotype GB; isotype US), collected in primary montane rain forest along Baeza-Tena road on southern slopes of Cordillera de Guacamayos, Prov. Napo, Ecuador, elev. ca 1800 m, 9 February 1980. "Big liana. Corolla white, anthers violet."

The suggested Colombian relative (Syn.: B. mitrata Uribe) has obovate-oblong slightly plinerved leaf blades, outer bracts high-united, elliptic-lanceate to narrowly ovate acute petals 22-30 mm long, and anthers 6.5-7 mm long with the dorsal acuminate spur ca 4.5-5.5 mm long. Blakea quadrangularis Triana and

perhaps B. schultesii Markgraf also belong in this assemblage; both have outer floral bracts essentially free, slightly plinerved leaf blades, and large connective spurs; the former also has well developed calyx lobes and rounded ovary cone. The Central American species-pair B. bella Standley-B. cuneata Standley have vegetative facies and bracts suggestive of the above group, but I have not examined material with petals or stamens; both were described as with petals rounded or truncate at the apex and with no mention of dorsal spurs on the stamen connectives. In the Flora of Ecuador, B. harlingii would key to near B. spruceana Cogn.

TOPOBEA ACUMINATA Wurdack, sp. nov.

T. caudata Wurdack affinis, foliis proportionaliter angustioribus petalis hypanthiisque parvioribus ovario paulo inferiore differt.

Ramuli graciles primum quadrangulares demum teretes, internodiis sicut foliis novellis primum obscure furfuraceis mox glabratis, nodis obscure caduceque strigulosis (ad 1 mm). Folia in quoque pari in dimensionibus plus minusve disparilia (usque ad 5: 1); petioli (in folia maiora) 1-1.5 cm longa; lamina (folia maiora) 7-12 X 1.7-2.7 cm elliptico-oblonga apice per 1-2.5 cm gradatim acuminato basi anguste acuta, subcoriacea et integra, 0.5-1 cm 5-pseudoplinervata pari interiore costa subcoalito nervis secundariis 0.5-0.7 mm inter se distantibus. Flores in quoque nodo superiore singuli vel bini, pedicellis gracilibus 0.9-1.2 cm longis; bracteae exteriores hypanthium aequantes 4.5 X 1.6 mm ellipticae acutae ad basim paulo (0.6 mm) coalitae; bracteae interiores 4 X 2.3 mm elliptico-ovatae acutae liberae. Hypanthium (ad torum) 2.2 mm longum glabrum; calycis tubus 0.8 mm longus, lobis 1.9-2.2 X 1.6 mm triangularibus acutis obscure furfuraceis. Petala 6.2-6.5 X 2.5 mm elliptico-oblonga acuminata apicem versus obscure ciliolata. Stamina glabra inter se non cohaerentes; filamenta 3.2 mm longa; antherae 3 X 0.6 X 0.5 mm anguste oblongae, poro unico 0.1-0.15 mm diam. dorsaliter inclinato; connectivum ad basim dorsaliter minute (0.1 mm) calcaratum. Stigma 0.15 mm diam.; stylus 6.5 X 0.35-0.1 mm glaber in ovarii collo 0.5 mm immersus; ovarium 4-loculare et 1/3 inferum, cono 2.2 mm alto glabro.

Type Collection: G. Harling & L. Andersson 17058 (holotype GB; isotype US), collected in remnants of primary rain forest at Tarqui 5 km south of Puyo, Prov. Pastaza, Ecuador, elev. ca 850 m, 8 March 1980. "Tree ca 4 m high. Corolla pale yellow."

The leaf blades in T. caudata have a length/width ratio (exclusive of the protracted tip) of 1.4-1.5 (rather than 3.5-3.6), larger bracts, petals 8-8.5 X 4.5 mm with rounded apex, hypanthium 5 mm long, and ovary ca 3/4 inferior. In the Flora of Ecuador, T. acuminata would key to near the more distantly related T. dodsonorum, with quite different foliage, smaller bracts, larger bluntly acute petals, and longer stamen connective tooth.

BOOK REVIEWS

Alma L. Moldenke

"ARCTIC AND ALPINE MYCOLOGY - The First International Symposium on Arcto-Alpine Mycology" edited by Gary A. Loursen & Joseph F. Ammirati, ix & 559 pp., 163 b/w fig., 148 photo., 21 maps & 31 tab. University of Washington Press, Seattle, Washington 98105. 1982. \$45.00.

This invitational conference was held at the Naval Arctic Research Laboratory operated by the University of Alaska at Barrow. The introductory paper gives the history of the operation (and non-operation) of the lab. The first scientific paper is on the ecology and distribution of the lower fungi. There follow 12 on the taxonomy and distribution of the *Ascomycetes* and the *Basidiomycetes*. Then there are 9 on the ecology of these higher fungi as fungi and as vegetative mycelia in arctic tundra peat. Most of the papers were followed by question-answer periods whose details were added. A list of fungi from a field foray is added. This is an interesting report on what must have been a very interesting set of meetings.

"THE AMERICAN WEATHER BOOK" by David M. Ludlum, xix & 296 pp., 44 b/w photo., 24 maps & 12 tab. Houghton-Mifflin Company, Boston, Massachusetts 02108. 1982. \$14.95 clothbound, \$8.95 paperbound.

This book is chock-full of detailed extremes of all phases of weather mainly for our 48 temperate contiguous states strongly influenced by prevailing westerly winds, but also for our arctic Alaska and tropical Hawaiian Islands. Only during the last 110 years have full records been kept by the U. S. Weather Bureau; they provide the main source for these reports. Organized by calendar and meteorological reasons January gives the extremes of cold weather, February snow, March winds, April floods, May tornadoes, June thunder and hail storms, July heat waves, August drought, September hurricanes, October air pollution, November fog, and December ice storms. The illustrations are convincing. There are included a few vivid verified accounts of persons caught in some of these extreme conditions -- as, for instance, that of a Marine pilot who ejected from his "dead" plane over a North Carolina thunderstorm and his 40-minute 9-mile descent through it. At the end of this useful, accurate and interesting compendium of meteorological facts are tables for extremes of precipitation by states, and a glossary.

"READINGS FROM SCIENTIFIC AMERICAN - GENETICS" introduced and edited by Cedric I. Davern, iv & 331 pp., 9 color photo., 100 color fig., 52 b/w photo., 72 b/w fig., & 13 tab. W. H. Freeman & Company, San Francisco, California 94104. 1981. \$9.95 paperbound and \$19.95 clothbound.

Editor Davern must have had a delicious task choosing from among the many outstanding articles "la crème de la crème" and organizing them into such a fine concoction according to the following introduced topics: (1) Principles of heredity, (2) Chemical basis of heredity, (3) Genetic analysis, (4) Genetic expression and regulation, (5) Genetic transactions, (6) Evolution and (7) Applied genetics. Mendel's "Experiments in Plant Hybridization", now appreciated because of "his vigorous quantitative and analytical approach, is served as a topping for all. There are the usual bibliographies, list of Scientific American's other articles on genetics, as well as the usual name and subject indexes. The book should be required reading along with a fine text for all regular and advanced genetics courses on the university level.

"BIOCHEMISTRY OF THERMOPHILY" edited by S. Marvin Friedman, xiii & 400 pp., 101 b/w fig., 34 photo., 67 tab. & 1 map. Academic Press, New York, N. Y. 10003. 1978. \$35.00.

The 23 interesting papers that comprise this book were presented at a seminar at the U. S. - Japan Cooperative Science Program in the East-West Center of Honolulu. They are organized about such topics as: lipids and membranes, ecological and genetic aspects, protein synthesis and proteins. The editor's preface emphasizes certain features of these thermophilic microorganisms. Since their macromolecules are heat-stable "they are often found as contaminants in canned food and dairy products" as well as "thermal pollutants of our aquatic environments". From an evolutionary standpoint "they appear to represent primordial growth forms". Since no index was added, it will take longer to hunt for any specific information in this book.

"PINE BARRENS: Ecosystem and Landscape" edited by Richart T. T. Forman, xlii & 601 pp., 9 color & 70 b/w photo., 28 maps, 149 fig. & 45 tab. Academic Press, New York, N. Y. 10003. 1979. \$42.50.

This excellently prepared study covers a great wealth of subject matter thoroughly, effectively, and yet free of excessive technical verbiage as it accounts for early and present human exploitation, geology and soils, climate and aquatic ecosystems, plants and vegetation patterns, and animals and animal communities (especially mosquitoes and "biting" flies!). The 33 papers are variously authored and are dedicated to the memory of Prof. Murray Buell who actually died in these interesting Pine Barrens while engaged in a

research project on land-use policy planning. This "book is a reference and a text, but most importantly presents information in a usable form for a wide range of individuals" -- ecologists, botanists, geologists, soil scientists, zoologists, hydrologists, limnologists, engineers, avocational naturalists and students of all these fields. I hope that this book will be released sometime in the near future in inexpensive paperbound form, the better to fit into the budgets of students in the nearby community colleges, state colleges and visitors to the state forests, etc. I hope that they will be motivated to keep their copies as actually describing memories of their own visits to this interesting New Jersey area.

"FOREST SUCCESSION - Concepts and Application" edited by Darrell C. West, Herman H. Shugart & Daniel B. Botkin, xv & 517 pp., 112 b/w fig. & 53 tab. Springer-Verlag, Inc., New York, N. Y. 10010. 1981. \$36.80.

Based upon the 25 well reported research papers of this timely conference report, current concepts about and case histories of succession "integrate the implications of space, time, and processes". What I especially like about this book is that along with important formulas, clear charts, and some very effectively presented figures of cycles of biochemicals and grosser products, I can still read and actually visualize boreal, coniferous and deciduous forests, all that goes on among the small living and dead in woody debris and the below-ground processes in forest succession, and the vegetational changes in chaparral, desert communities and savannas.

"PRINCIPLES OF PLANT PATHOLOGY" by J. G. Manners, viii & 264 pp., 36 b/w fig., 14 tab., 2 maps, & 25 photo. Cambridge University Press, Cambridge, England & New York, N. Y. 10022. 1982. \$47.50 clothbound & \$17.95 paperbound.

This is a well planned, clearly stated text "covering the principles on which present-day plant pathology is based" rather than "a manual for the identification and control of specific plant diseases" which are left to other publications and to field and lab training with experienced workers. The topics covered in this book are the causes of plant disease, the physiology and genetics of host-parasite pathogen relationships, epidemiology and disease control. There is a particularly good glossary, a long, long list of references and some very effective diagrams, as, for instance, fig. 31 "showing interaction of elements during a pathogen generation" of *Erysiphe graminis*.

PHYTOLOGIA

An international journal to expedite botanical and phytoecological publication

Vol. 52

October 1982

BOTANICAL GARDEN

CONTENTS

YATSKIEVYCH, G., <i>A conspectus of the Lennoaceae</i>	73
HATHERILL, J. R., & VOLZ, P. A., <i>In vitro drug tolerance of oral Candida isolates from healthy individuals</i>	75
GRETHER, R., <i>Mimosa albida, Sensitivae (Leguminosae) in Mexico</i>	81
OSWALD, F. W., <i>A new form of Helianthus from South Florida</i> ..	93
WASSHAUSEN, D. C., <i>New species of Justicia (Acanthaceae) from Venezuela</i>	95
CALDERON de RZEDOWSKI, G., <i>Dos especies nuevas de Viola (Violaceae) de las montañas del Valle de Mexico</i>	99
MOLDENKE, H. N., <i>A Sixth Summary of the Verbenaceae, Avicenniaceae, Stilbaceae, Chloanthaceae, Symphoremaceae, Nyctanthaceae, and Eriocaulaceae of the world as to valid taxa, geographic distribution and synonymy. Supplement 2</i>	110
MOLDENKE, H. N., <i>Notes on new and noteworthy plants. CLX</i>	129
MOLDENKE, H. N., <i>Additional notes on the genus Vitex. XXXVI</i>	132
ST. JOHN, H., <i>A new species of Labordia (Loganiaceae). Hawaiian plant studies 115</i>	145
MOLDENKE, A. L., <i>Book reviews</i>	148

Published by Harold N. Moldenke and Alma L. Moldenke

303 Parkside Road
Plainfield, New Jersey 07060
U.S.A.

Price of this number \$3.00; for this volume \$13.00 in advance or \$14.00 after close of the volume; \$5.00 extra to all foreign addresses and domestic dealers; 512 pages constitute a complete volume; claims for numbers lost in the mails must be made immediately after receipt of the next following number for free replacement; back volume prices apply if payment is received after a volume is closed.

A CONSPECTUS OF THE LENNOACEAE

George Yatskievych*
Herbarium, University of Arizona, Tucson 85721

The small parasitic angiosperm family Lennoaceae has received sporadic attention from taxonomists in the last 150 years. The first comprehensive treatment was that of Solms-Laubach (1870), and the only other attempt to treat all of the species was by Rydberg (1914) for North American Flora. Other workers have dealt with portions of the family, i.e. Suessenguth (1927) and Steyermark (1968) with Lennoa, and Templeton (1962) with Pholisma.

Nomenclatural changes published here have resulted from a recently completed study of the family, which served as a Master's thesis at the University of Arizona and is currently undergoing revision for future publication. Rationale for the new combinations will be discussed in detail in the forthcoming monograph. The following conspectus of the family is presented primarily to validate the new names.

LENNOACEAE Torrey ex Solms-Laubach, Abh. Naturf. Ges. Halle 11:174. 1870. nom. cons.

I. LENNOA La Llave & Lexarza, Novorum Vegetabilium Descriptiones 1:7. 1824.

1. LENNOA MADREPOROIDES La Llave & Lexarza, Novorum Vegetabilium Descriptiones 1:7. 1824. Type: MEXICO: MICHOACAN: near Valladolid [Morelia], Lexarza in autumn. Lost and presumed destroyed. Neotype designated here: MEXICO: MICHOACAN: near Morelia, Cerro Punguato, in a maize field, elev. 2250 m, 26 Sep 1958, J.G.Hawkes, J.P.Hjerting, & R.N.Lester 1564 (K). Lennoa madreporoides Steudel, Nom. Bot., ed. 2, 2:22. 1841. Spalm.

1a. LENNOA MADREPOROIDES f. MADREPOROIDES
Lennoa madreporoides ssp. pringlei Suessenguth, Flora 122:296. 1927. Type: C.G.Pringle 9101.

Lennoa madreporoides ssp. schaaffneri Suessenguth, Flora 122:296. 1927. Type: J.G.Schaffner 452.

1b. LENNOA MADREPOROIDES f. CAERULEA (H.B.K.) Yatskievych comb. nov.

Corallophyllum caeruleum H.B.K., Nova Gen. Species Plant. 7: 276. 1825. Type: Bonpland 4395.

* present address: Dept. of Biology, Indiana University, Bloomington, IN 47405. Portions of this study were funded by grants from Sigma Xi, the Scientific Research Society, and by the University of Arizona Graduate Research Development Fund, to whom the author is indebted.

- Lennoa caerulea (H.B.K.) Fournier, Bull. Soc. Bot. France 16:11. 1869.
- Lennoa madreporoides ssp. reichei Suessenguth, Flora 122:296. 1927. Type: K.Reiche without date or number (M).
- Lennoa madreporoides var. caerulea (H.B.K.) Steyermark, Acta Bot. Venez. 3:228. 1968.
- Lennoa madreporoides ssp. australis Steyermark, Acta Bot. Venez. 3:230. 1968. Type: J.A.Steyermark & A.Braun 94518.
- II. PHOLISMA Nuttall ex Hooker, Icon Pl. 7: pl. 626. 1844.
1. PHOLISMA ARENARIUM Nuttall ex Hooker, Icon. Pl. 7: pl. 626. 1844. Type: T.Nuttall without date or number (K).
- Lennoa arenaria (Nuttall ex Hooker) Fournier, Bull. Soc. Bot. France 16:11. 1869.
- Pholisma depressum Greene, Bull. Calif. Acad. Sci. 1:198. 1885. Type: E.L.Greene on 10 May 1885.
- Pholisma paniculatum Templeton, Bull. S. Calif. Acad. Sci. 37:98. 1938. Type: B.C.Templeton, W.D.Pierce, & D.Pool 4588.
2. PHOLISMA CULIACANA (Dressler & Kuijt) Yatskievych comb. nov. Ammobroma culiacana Dressler & Kuijt, Madroño 19:180. 1968. Type: Dressler 2175.
3. PHOLISMA SONORAE (Torrey ex Gray) Yatskievych comb. nov. Ammobroma sonora Torrey ex Gray, Mem. Amer. Acad. Arts 5:327. 1854. Type: A.B.Gray on 17 - 19 May 1854.

IN VITRO DRUG TOLERANCE OF ORAL CANDIDA ISOLATES
FROM HEALTHY INDIVIDUALS

J. R. Hatherill* and P. A. Volz**

*Department of Toxicology, The University of Michigan
Ann Arbor, Michigan 48104

**Mycology Laboratory, Eastern Michigan University
Ypsilanti, Michigan 48197

Abstract: The isolation frequency of Candida albicans, C. krusei, C. guilliermondii, and C. stellatoidea were noted on the dorsum of the tongue and the maxillary gingival sulcus of 202 healthy human subjects. C. albicans was the predominant isolate and the tongue was slightly more common for Candida isolation. Drug tolerance indexes demonstrated variable resistance in C. albicans isolates in comparison with the other Candida species.

Introduction: Oral thrush is a common form of candidiasis, well documented as case reports or as general mycotic descriptions (2,4,7,9,10,11,12). Causal agents of thrush can be present in the oral microflora of healthy test subjects (1). It is widely established that Candida albicans is the common causative agent of thrush, however, many investigations involving oral flora did not distinguish between Candida species. The present investigation identifies pathogenic species of Candida present on the dorsum of the tongue and the maxillary gingival sulcus in healthy human subjects. The mouth areas sampled are frequently invaded in cases of thrush even when no other involvement in the patient occurs (10).

The presence of Candida species is important to monitor due to possible disease expression in high-risk patients (3), particularly in cancer patients before irradiation (5), in patients on long-term immunosuppressive or antibiotic therapy and before the use of general anesthesia (6). Species and isolate variation of Candida have been shown in dimorphism with numerous biochemical differences (1,14), and variation is also found in dissimilar drug tolerances.

Materials and Methods: The dorsum of the tongue and the maxillary gingival sulcus of 202 healthy university students were sampled using sterile polyester swabs. Collected material was immediately streaked on Sabouraud dextrose agar plates and incubated 72 h at 37°C. Stocks of the Candida isolates were maintained in pure culture at 25°C on Sabouraud maltose agar (SMA) slants. Species identification was accomplished with corn meal agar Dalmau plates for the detection of pseudohyphal characteristics (14). The germ tube test was utilized for positive germ tube production of C. albicans and C. stellatoidea (8). Further separation of the two species was obtained by carbohydrate assimilation tests and colony characteristics (14,19).

Experimental and known antifungal test drugs were selected to assay fungal growth inhibition (Table 1). The strains of orally isolated Candida including C. albicans, C. krusei, C. stellatoidea, and C. guilliermondii were subjected to drugs dispensed in concentrations of 1000 mcg/ml in assay disks on SMA plates previously spread

with suspensions of the test organism. Zones of growth inhibition were recorded in mm with Candida species and isolates.

Results: Of the 202 university students examined, Candida isolates were present in 53 or 26.2 % of the individuals. A total of 28 or 13.9 % of the subjects contained Candida species on the dorsum of the tongue but not in the maxillary sulcus, while 16 students or 8.0 % had Candida on both the dorsum of the tongue and maxillary gingival sulcus. Candida was recorded exclusively from the maxillary gingival sulci in nine subjects or 4.4 % of the total number of students examined. The 53 isolates of Candida included two isolates of C. krusei, and one isolate each of C. guillermundii and C. stellatoidea. The remaining Candida oral isolates were C. albicans represented by a 95 % confidence interval (T-distribution) as presented in Charts 1 and 2.

All Candida isolates were subjected to further study in the drug investigations. The greatest drug intolerance was noted with 2-cyano-4-nitrothiophene (Abbott 36042). This drug is derived from the addition of a highly toxic cyano group with thiophene. Thiophene is a constituent of biotin, a normal substrate metabolized by yeast organisms.

The experimental drug Abbott 6131 demonstrated the second largest inhibition. Mycophenolic acid exhibited growth inhibition which diminished progressively from the central focus of disk application outward. Isolates C. stellatoidea and C. guillermundii had complete resistance to mycophenolic acid. C. guillermundii, C. krusei, and C. stellatoidea showed significant resistance toward 5-fluorocytosine with respect to isolates of C. albicans. Isolate C. stellatoidea expressed complete resistance to amphotericin B, in contrast to an average inhibition of 2.4 mm with C. albicans. Erythromycin B had negligible effects on C. guillermundii, while C. albicans isolates expressed an average of 4.7 mm growth inhibition. The isolate C. stellatoidea was resistant to exposure of TAEM, while the remaining Candida isolates had a significant response.

Nystatin, chlorambucil, Abbott 25579, DMCTC, and niddamycin did not demonstrate significant differences between isolates of the species.

Discussion: There is considerable variation in the isolation frequency of Candida in healthy and debilitated patients (3,5,20). Isolation frequencies of Candida were recorded as 37 % from gum samplings and 47.7 % in saliva cultures (11). Candida in mouth washings of children and adults were 33.5 % and 50 % respectively (15). Sputum examined in hospital personnel and medical students recovered a 55 % incidence of Candida with 50 % identified as C. albicans and the remaining 5 % as other Candida species (2). Previous investigations did not examine the additional medically important Candida species. C. stellatoidea, C. guillermundii, and C. krusei isolates in the current study displayed significantly different drug tolerance results when compared to the C. albicans group. The current series produced a 26.2 % overall recovery of Candida.

Mycophenolic acid did not inhibit C. stellatoidea and C. guillermundii as similarly found in an earlier study with the drug on C.

guillermoidii, C. krusei, and C. pseudotropicalis (16). However, mycophenolic acid did exhibit a response to C. stellatoidea at concentrations of 3.9 mcg/ml. Drugs commonly utilized for candidiasis therapy are nystatin, 5-fluorocytosine, and amphotericin B. No conclusive species variation was noted with nystatin. Growth inhibition with 5-fluorocytosine was either intense or negligible. Variability is reflected in the 95 % confidence interval as shown in Charts 1 and 2.

Tolerance of C. albicans to 5-fluorocytosine was previously examined, and some strains were resistant at concentrations of 1,000 mcg/ml (18). Previous reports have noted successful treatment of systemic candidiasis with 5-fluorocytosine (17). However, numerous strains of Candida have demonstrated abilities to acquire resistance to 5-fluorocytosine (13). The current study indicated that isolates C. stellatoidea and C. krusei were completely resistant to the antifungal agent 5-fluorocytosine, while C. albicans and C. guillermoidii demonstrated growth inhibition. The isolate C. guillermoidii displayed complete resistance to the systemic antifungal agent amphotericin B. In contrast, C. albicans exhibited significant growth inhibition towards amphotericin B.

Table 1.

Drug Modes of Action

Test Drug	Mode of Action
Niddamycin	Interferes with cell wall or membrane integrity
Amphotericin B	
Erythromycin B	
Nystatin	
Mycophenolic Acid	
Triacetyloleandomycin (TAEM)	
5-Fluorocytosine	Nucleic acid synthesis inhibitor toxic cyano poison
Abbott 36042	
Dimethylchlorotricycline (DMCTC)	Experimental
Abbott 25579	
Abbott 6131	
Chlorambucil	Chemotherapeutic alkylating agent

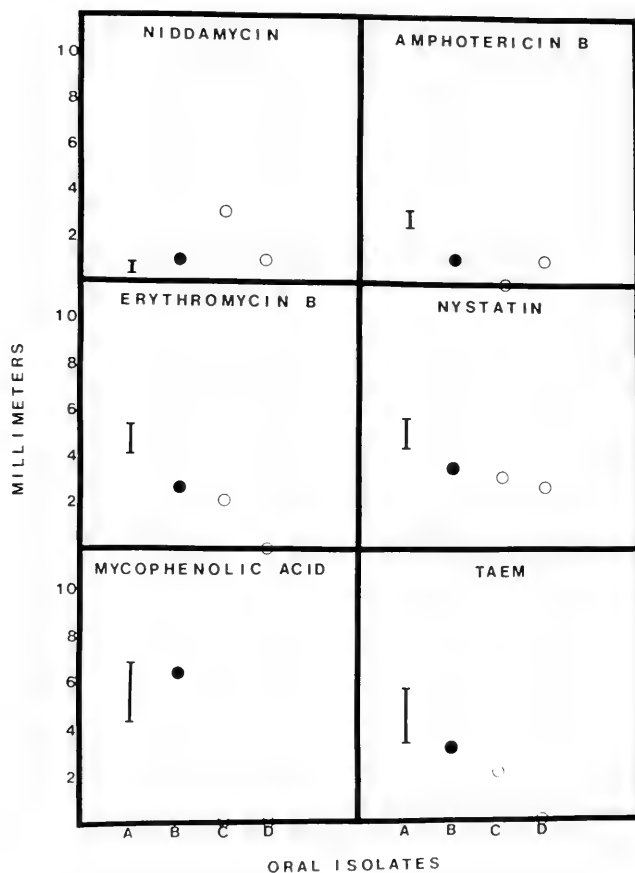


Chart 1.

Growth inhibition of *Candida* oral isolates with drugs at 1,000 mcg/ml affecting cell wall or membrane structures.

Figure legend: A *C. albicans*, t-distribution of 49 isolates

B *C. krusei*, 2 isolates

C *C. guilliermondii*, 1 isolate

D *C. stellatoidea*, 1 isolate

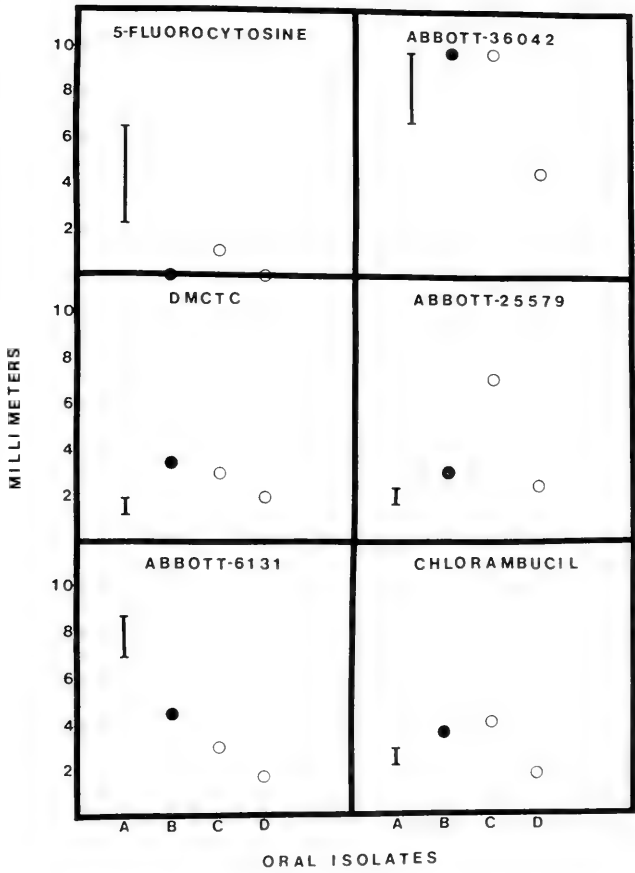


Chart 2.
Growth inhibition of *Candida* oral isolates with an alkylating agent, experimental, and nucleic acid inhibiting drugs at 1,000 mcg/ml.

References:

1. Baker, R.D. 1971. Human infection with fungi, Actinomycetes, and algae. Springer-Verlag, New York.
2. Baum, G.L. 1960. The significance of Candida albicans in human sputum. New Eng. J. Med. 263:70-73.
3. Berdicevsky, I., Ben-Aryeh, H., Glick, D. & Gutman, D. 1977. A strip test for detecting Candida in the oral cavity. Oral Surg. 41:206-209.
4. Cawson, R.A. 1966. Chronic oral candidiasis and leukoplakia. Oral Surg., Oral Med., Oral Path. 22:582-591.
5. Chen, T.Y. & Webster, J.H. 1974. Oral monilia study on patients with head and neck cancer during radiotherapy. Cancer 34:246-9.
6. Jenkins, W.M.M., Thomas, H.C. & Mason, D.K. 1973. Oral infections with Candida albicans. Scottish Med. J. 18:192-200.
7. Lehner, T. 1964. Oral thrush, or acute pseudomembranous candidiasis: A clinicopathologic study of 44 cases. Oral Surg., Oral Med., Oral Path. 18:27-37.
8. Lenette, E.H., Spaulding, E.H. & Truant, J.P. 1974. Manual of Clinical Microbiology. Amer. Soc. Micro., Washington, D.C.
9. Lighterman, I. 1951. Oral moniliasis, a complication of aureomycin therapy. Oral Surg., Oral Med., Oral Path. 4:1420-1426.
10. Lilienthal, B. 1955. The pathogenicity of Candida albicans isolated from the mouth. Oral Surg., Oral Med., Oral Path. 8:1214-1217.
11. Lilienthal, B. 1950. Studies on the flora of the mouth. III. Yeast-like organisms. Some observations on their incidence in the mouth. Australian J. Exp. Biol., Med., and Sci. 28:279-286.
12. Lilienthal, B., Harris, D. & Arnett, A.J. 1956. Moniliasis, a report of 3 cases. Oral Surg., Oral Med., Oral Path. 9:632-637.
13. Lindquist, J.A., Rabinovich, S. & Smith, I.M. 1973. 5-Fluorocytosine in the treatment of experimental candidiasis in immuno-suppressed mice. Antimicrob. Agents and Chemother. 4:58-61.
14. Lodder, J. 1960. The Yeasts, 2nd Ed. North-Holland Pub. Co., Amsterdam.
15. Marples, M.J. & DiMenna, M.E. 1952. The incidence of Candida albicans in Dunedin, New Zealand. J. Path. and Bact. 64:497-502.
16. Noto, K., Sawada, M., Ando, K. & Koyama, K. 1969. Some biological properties of mycophenolic acid. J. Antibiotics 22:165-169.
17. Record, C.O., Skinner, J.M., Sleight, P. & Speller, D.C.E. 1971. Candida endocarditis treated with 5-fluorocytosine. Brit. Med. J. 1:262-264.
18. Shadomy, S. 1969. In vitro studies with 5-fluorocytosine. Appl. Micro. 17:871-877.
19. Shepherd, M.G. & Sullivan, P.A. 1976. The production and growth characteristics of yeast and mycelial forms of Candida albicans in continuous culture. J. Gen. Micro. 93:361-370.
20. Young, G., Resca, H.G. & Sullivan, M.T. 1951. The yeasts of the normal mouth and their relation to salivary acidity. J. Dent. Res. 30:426-430.

MIMOSA ALBIDA, SENSITIVAE (LEGUMINOSAE) EN MEXICO

Rosaura Grether
Depto. de Biología, División C.B.S.
Universidad Autónoma Metropolitana-Iztapalapa
Apdo. Postal 55-535, 09340 México, D.F.

Mimosa albida H. & B. ex Willd. es una especie notablemente polimórfica, con una amplia distribución en América, desde Brasil y Bolivia hasta las regiones tropicales de México. A pesar de su gran abundancia, son pocos los autores que han estudiado esta especie en forma integral; el trabajo más reciente es el realizado por Rudd (1968), quien hace una revisión de *M. albida* y reconoce 7 variedades.

Considerando que se ha encontrado una variedad nueva en el estado de Oaxaca y tomando en cuenta que de las 7 variedades descritas, 4 se encuentran en México, se juzga conveniente proporcionar una clave, así como las características y distribución de estas variedades.

Mimosa albida queda comprendida en la Sección Eumimosa o Mimosa (de acuerdo con la nomenclatura actual), caracterizada por la presencia de estambres en igual número que los lóbulos de la corola y dentro de esta Sección, en la Serie Sensitivae, la cual se distingue por sus hojas con un par de pinnas, cada una con dos pares de folíolos relativamente grandes, con el folíolo inferior interno de cada pinna reducido o ausente y por sus flores dispuestas en cabezuelas.

Mimosa albida H. & B. ex Willd. Sp.Pl. 4: 1030. 1806.

Arbusto erecto, a veces trepador o rastrero, llegando en ocasiones a ser un árbol pequeño hasta 3 m de alto, armado con agujones recurvados, rara vez inerme; generalmente sin látex, aunque en algunos casos con látex lechoso en ramas jóvenes y hojas; ramas generalmente hispidadas y puberulentas, cuando menos las ramas jóvenes, rara vez estrigosas o glabras. Pecíolo espinoso a inerme; pinnas un par, folíolos 2 pares, el folíolo inferior interno reducido o ausente, de 2-11 cm de largo, 1-6.5 cm de ancho, oblicuamente elípticos a ovados u obovados, estrigosos y puberulentos en una o en ambas superficies, rara vez glabros por completo, margen con setas generalmente largas y adpresas, ápice agudo a mucronulado. Cabezuelas globosas a ligeramente subglobosas, 1-2 cm de diámetro incluyendo los estambres, axilares solitarias o en grupos de

2-4 y dispuestas en racimos o panículas terminales. Flores generalmente hermafroditas, aunque en ocasiones se presentan flores estaminadas en la porción inferior de la misma cabezuela, semejantes en forma y tamaño a las hermafroditas; bracteolas de 1/3 a igual longitud que la corola; cáliz campanulado, diminuto, 1/7-1/5 de la longitud de la corola, con margen ciliado o ligeramente paleáceo; corola de 4 lóbulos, rara vez 5, pubescentes a glabros, de color rosado; estambres en igual número que los lóbulos de la corola, filamentos lila. Fruto sésil a ligeramente estipitado, 1.5-3.5 cm de largo y 0.4-1 cm de ancho, dividido en 1-5 (-8) artejos, valvas y margen estrigosos y pubescentes o estrigosos y puberulentos, rara vez sólomente estrigosos o sólomente hispídos.

Las variedades de *Mimosa albida* reconocidas por Rudd (loc. cit.) son:

M. albida H. & B. ex Willd., var. *albida*
(De México a Perú, Bolivia y Brasil)

M. albida H. & B. ex Willd., var. *strigosa* (Willd.) Rob.
(De México a Ecuador y Bolivia)

M. albida H. & B. ex Willd., var. *glabrion* Rob. (De México a Panamá)

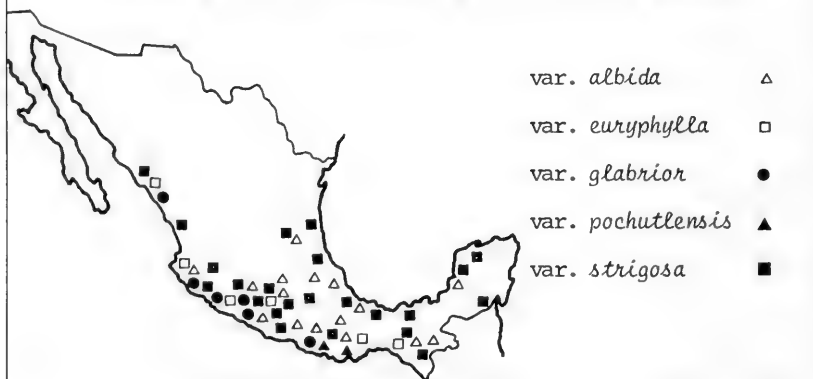
M. albida H. & B. ex Willd., var. *euryphylla* Rob. (México y Guatemala)

M. albida H. & B. ex Willd., var. *aequatoriana* Rudd (Ecuador)

M. albida H. & B. ex Willd., var. *willdenowii* (Poir.) Rudd (Venezuela)

M. albida H. & B. ex Willd., var. *erratica* Macbr. (Ecuador y Perú)

DISTRIBUCION DE LAS VARIEDADES DE MIMOSA ALBIDA EN MEXICO



CLAVE PARA LAS VARIEDADES DE *Mimosa albida* QUE SE ENCUENTRAN EN MEXICO*:

1. Folíolos con el haz glabro a puberulento

2. Ramas y envés de los folíolos glabros o espaciadamente estrigosos; fruto espaciadamente estrigoso y puberulento; corola pubescente
..... var. *glabrior*

2. Ramas híspidas y puberulentas; envés de los folíolos densamente estrigoso y puberulento

3. Fruto estrigoso y pubescente; corola pubescente
..... var. *albida*

3. Fruto glabro a espaciadamente estrigoso; corola glabra a espaciadamente puberulenta
..... var. *euryphylla*

1. Folíolos con el haz estrigoso y puberulento

4. Fruto estrigoso y pubescente a estrigoso y puberulento; corola pubescente; margen del folíolo con setas largas, adpresas en una hilera
..... var. *strigosa*

4. Fruto híspido, sin otro tipo de tricomas; corola glabra; margen del folíolo con setas cortas, no adpresas, dispuestas irregularmente
..... var. *pochutlensis*

* En esta clave es frecuente el uso de combinaciones de dos tipos de pubescencia, ya que son muy características en la distinción de las variedades.

Mimosa albida H. & B. ex Willd., var. *albida*

TIPO: PERU: Moche (América Meridional), *Humboldt & Bonpland* 3756 (HOLOTIPO: B; fototipo: MEXU!; microficha del Herbario de Willdenow: MEXU!).

Mimosa adhaerans H.B.K., Nov. Gen. et Sp. 6: 249. 1824.

TIPO: VENEZUELA: Orinoco, *Humboldt & Bonpland*.

Mimosa racemosa Slecht. *Linnaea* 12: 577. 1838.

TIPO: MEXICO: Oaxaca (in: Rudd, loc. cit.).

Arbusto erecto, en ocasiones trepador, con ramas hispidas y puberulentas; folíolos glabros a puberulentos en el haz, densamente estrigosos y puberulentos en el envés; flores con corola pubescente, arregladas en cabezuelas globosas a ligeramente subglobosas, pedúnculo hispido y puberulento; fruto sésil a ligeramente estipitado, valvas y margen estrigosos y pubescentes.

MATERIAL ADICIONAL SELECTO:

MEXICO. JALISCO: 2 km N de la carretera Pto. Vallarta-El Tuito, camino al Caule, Mpio. El Tuito, Nov. 28, 1979, J. A.S. Magallanes 2139 (MEXU; UAM-I); MICHOACAN: 5 km SW de Zitácuaro, Jul. 8, 1977, J.C. Soto 114 (MEXU); GUERRERO: Campo Morado, Distrito de Mina, Jul. 24, 1939, G.B. Hinton et al. 14475 (MEXU); OAXACA: 10 km S de Valle Nacional, Dic. 20, 1979, R. Grether 1410 y H. Quero (MEXU; UAM-I); 23 km SE de Tuxtepec, Dic. 21, 1979, R. Grether 1413 y H. Quero (MEXU; UAM-I); 18 km S de Suchixtepec, carretera Pochutla Oaxaca, Abr. 24, 1976, M. Sousa et al. 5613 (MEXU); 3 km SW de Llanos de Amusgos, al NW de San Pedro Amusgos, Distrito de Putla, Dic. 6, 1978, M. Sousa et al. 9905 (MEXU); CHIAPAS: 34 km NE de Chiapa de Corzo, Dic. 9, 1978, R. Grether 1164 y H. Quero (MEXU; UAM-I); 13 km E-NE de Oxchuc camino de San Cristobal de las Casas a Ococingo, Dic. 15, 1979, R. Grether 1381 y H. Quero (MEXU; UAM-I); 3 km N de Jiquipilas, Mpio. Cintalapa, Ene. 5, 1982, R. Grether 1618, H. Quero y L. Lehtonen (MEXU; UAM-I); SAN LUIS POTOSI: 3 mi N de Tamazunchale, Ene. 9, 1972, P. Gallian y M. Leake 1046 (MEXU); VERACRUZ: 19 km SE de Jalapa, Ago. 22, 1975, R. Grether 388 y H. Quero (MEXU; UAM-I); CAMPECHE: 5 km S de Lerma, carretera de Champotón a Campeche, Dic. 27, 1976, R. Grether 515 y H. Quero (MEXU; UAM-I); PUEBLA: 4 km NE de Huachinango, Nov. 5, 1978, P. Basurto y G. Durán 79 (MEXU; UAM-I); Cuauhtapanaloyan, Cuetzalan, Nov. 21, 1980, F. Basurto y R. Patrón 236 (MEXU; UAM-I); Cerro Colorado, Atzalan, Feb. 28, 1976, M.G. Zola 192 (MEXU); ESTADO DE MEXICO: Malpaís, San Nicolás, Valle de Bravo, Oct. 11, 1953, E. Matuda et al. 29430 (MEXU); DISTRITO FEDERAL: Cerro Xochitepec, cerca de Xochitepec, Delegación Xochimilco, Oct. 16, 1966, J. Rzedowski 23293 (MEXU); MORELOS: Cuernavaca, Jul. 26, 1981, O.R. Dorado 18

(MEXU).

DISTRIBUCION EN MEXICO: De Jalisco a Chiapas, en la vertiente del Pacífico; San Luis Potosí, Puebla, Distrito Federal, Estado de México y Morelos, en el centro del país; Veracruz y Campeche, en la vertiente del Golfo de México.

Mimosa albida H. & B. ex Willd., var. *eurypphylla* Rob., Proc. Amer. Acad. 33: 311. 1898.

TIPO: MEXICO. Chiapas: Valle de Jiquipilas, E. W. Nelson 2927 (HOLOTIPO: US!; ISOTIPO: GH!).

Arbusto erecto, con ramas híspidas y puberulentas; folíolos glabros a ligeramente puberulentos en el haz, es trigosos y ligeramente puberulentos en el envés; flores con corola glabra a escasamente puberulenta, en cabezuelas globosas, pedúnculo híspido y puberulento; fruto ligeramente estipitado, valvas y margen glabros o espaciadamente estrigosos.

MATERIAL ADICIONAL SELECTO:

MEXICO. SINALOA: La Nevería, Nov.16, 1926, Y. Mexia 1099 (US); JALISCO: 2 km de San Vicente, camino Tamazula-Santa Rosa, Mpio. Tamazula, Ago.30, 1979, J.A.S. Magallanes 1734 (MEXU; UAM-I); 14 km N de Cuautla, cerca de Los Volcanes, Mpio. Atenguillo, Sept.7, 1979, J.A.S. Magallanes 1922 (MEXU; UAM-I); Talpa de Allende, Mpio. Talpa, Sept. 8, 1980, J.A.S. Magallanes 1939 (MEXU; UAM-I); MICHOACAN: 24 km SW de Ario de Rosales, Ago.20, 1977, M. Sousa et al. 8011 (MEXU); ESTADO DE MEXICO: entre Valle de Bravo y Donato Guerra, Sept.10, 1954, E. Matuda et al. 31614 (MEXU); OAXACA: Pluma Hidalgo, Ago.18, 1917, B. P. Reko 3368 (US); 4 km N de Matías Romero, Distrito Juchitán, Oct. 30, 1977, M. Sousa et al. 8786 (MEXU); CHIAPAS: cerca de la estación de microondas La Mina, 12 km S de la carretera 190, cerca de Rizo de Oro, Mpio. Cintalapa, Oct. 16, 1971, D.E. Breedlove y R.F. Thorne 20585 (MEXU); cerca de Jalisco (Arriaga), Dic.12, 1906, C.B. Doyle 49 (US); 1 km SE de Arriaga, Dic.12, 1978, R. Grether 1198 y H. Quero (MEXU; UAM-I); 6 km N de Arriaga, Dic.12, 1978, R. Grether 1205 y H. Quero (MEXU; UAM-I); Arriaga, Oct.15, 1933, C.D. Mell 2194 (US).

DISTRIBUCION EN MEXICO: vertiente del Pacífico: Sinaloa a Michoacán, Estado de México, Oaxaca y Chiapas.

Dado que el tipo de esta variedad es un ejemplar con flores, Rudd (loc.cit.) basa su descripción del fruto en material de Arriaga, Chis., localidad que se encuentra a proximadamente a 70 km al SW de Jiquipilas.

A pesar de que no hemos encontrado la variedad eu-

ryphylla en la localidad tipo, si hemos colectado ejemplares con flor y fruto de esta variedad en la región de Arriaga, confirmando lo asentado por Rudd.

Mimosa albida H. & B. ex Willd., var. *glabrator* Rob., Proc. Amer. Acad. 33: 311. 1898.

TIPO: GUATEMALA. Departamento de Santa Rosa: Malpaís, Heyde & Lux, distribuido como J.D. Smith 4133 (GH!; US!).

Mimosa sesquijugata Donn.Sm., Bot. Gaz. 13: 74. 1888.

TIPO: GUATEMALA. Departamento de Santa Rosa: Baja Verapaz, Jul. 1887, H. von Turckheim 1327 (US!).

Mimosa manzanilloana Rose, Contr. U.S. Nat. Herb. 1: 326. 1895.

TIPO: MEXICO. Colima: Manzanillo, Dic. 1890, E. Palmer 905 (GH!; US!).

Arbusto trepador o rastrero, con ramas glabras a escasamente estrigosas y puberulentas; folíolos glabros en ambas superficies o espaciadamente estrigosos en el envés; flores con corola puberulenta a pubescente, en cabezuelas globosas, pedúnculo hispido a estrigoso; fruto sésil, valvas y margen espaciadamente estrigosos y puberulentos.

MATERIAL ADICIONAL SELECTO:

MEXICO. SINALOA: Mazatlán, Ene. 1923, J. González Ortega 851 (MEXU); 6 km SW de Potrerillos, km 227 carretera de Durango a Mazatlán, Sept. 17, 1978, R. Grether 1093 y H. Quero (MEXU; UAM-I); 42 km NE de Concordia, Sept. 17, 1978, R. Grether 1095 y H. Quero (MEXU; UAM-I); JALISCO: 10 km S-SE de Puerto Vallarta, Dic. 15, 1977, R. Grether 848 y H. Quero (MEXU; UAM-I); 13 km S de El Tuito, Dic. 16, 1977, R. Grether 863 y H. Quero (MEXU; UAM-I); Los Chinos, 8 km SW de El Tuito, Mpio. El Tuito, Nov. 27, 1979, J.A.S. Magallanes 2129 (MEXU; UAM-I); Barranca, cerca de Guadalaraja, Jun. 1886, E. Palmer 705 (MEXU); Estación de Biología Tropical de Chamela, Ene. 18, 1975, A. Pérez-Jiménez 1116 (MEXU); COLIMA: vecindades de Manzanillo, Nov. 27, 1925, R.S. Ferris 6038 (MEXU); 200 m S de Chihuahatlán, Mpio. Manzanillo, límite con Jalisco, Mar. 21, 1980, J. A. S. Magallanes 2200 (MEXU; UAM-I); MICHOACAN: 6 km de Ostula, río arriba, Mpio. Aguila, Dic. 7, 1979, B. Guerrero et al. 454 (MEXU); 5 km SE de La Huacana, carretera a Iguarán, Oct. 25, 1981, J.C. Soto 3499 (MEXU); 33 km NE de Arteaga carretera Nueva Italia-Playa Azul, Mar. 29, 1979, J.C. Soto y S. Zárate 1345 (MEXU); GUERRERO: Copacabana arena, Dic. 15, 1966, W. Boege 500 (MEXU); 67 km NW de Zihuatanejo, camino a Playa Azul, Dic. 20, 1979, R. Grether 890 y H. Quero (UAM-I); Atoyac, Distrito Galeana, Nov. 12, 1937, G.B. Hinton et al. 10904 (MEXU); Placeres, Distrito Mina,

Sept.2, 1937, G.B. Hinton et al. 10640 (MEXU); 2.3 mi S de El Ocotito, 56.3 mi S de Chilpancingo, Nov.16, 1978, L. Rico y V.A. Funk 231 (MEXU); OAXACA: 7 km NW de Pinotepa Nacional, Dic.25, 1974, L.W. Boege 3326 (MEXU); 21 km NW de Pinotepa Nacional, Abr.17, 1976, M. Sousa et al. 5500 (MEXU); 1 km NE de San Pedro Amusgos, Distrito de Pu tla, Feb.4, 1977, M. Sousa et al. 7053 (MEXU).

DISTRIBUCION EN MEXICO: De Sinaloa a Oaxaca, en la vertiente del Pacífico.

Robinson menciona en la descripción original de esta variedad, que la corola es glabra, sin embargo, la revisión del material tipo de la misma, los tipos de *Mimosa manzanilloana* y *M. sesquijugata* y material adicional colectado en México, nos permite afirmar que la corola presenta pubescencia en forma constante en esta variedad.

Mimosa albida H. & B. ex Willd., var. *strigosa* (Willd.) Rob. Proc. Amer. Acad. 33: 311. 1898.

Mimosa strigosa Willd., Sp. Pl. 4: 1030. 1806.
TIPO: AMERICA MERIDIONAL, Humboldt & Bonpland (HOLOTIPO: B; microficha del Herbario de Willdenow : MEXU!).

Mimosa williamsii Standl., Contr. U.S. Nat. Herb. 18: 105. 1916, non Rusby, 1912.
TIPO: PANAMA. Penonome y vecindades, Feb.-Mar. 1908, R.S. Williams 101 (US!).

Mimosa standleyi Macbr., Contr. Gray Herb. 59: 12. 1919. nom. nov. basado en *M. williamsii* Standl.

Arbusto erecto, en ocasiones trepador, con ramas densamente hispidas y puberulentas, con látex lechoso por lo menos en ramas jóvenes; folíolos densamente estrigosos y puberulentos en ambas superficies; flores con corola pubescente, en cabezuelas globosas a ligeramente subglobosas, pedúnculo hispido a estrigoso y puberulento; fruto sésil a ligeramente estipitado, valvas y margen estrigosos y pubescentes a estrigosos y puberulentos.

MATERIAL ADICIONAL SELECTO:

MEXICO. SINALOA: Picacho del Cerro de la Silla, San Ignacio, Ene.29, 1919, M. Narváez y A.E. Salazar 733 (US); cerca de Colomas, Jul.18, 1897, J.N. Rose 1731 (US); NAYARIT: La Higuera Blanca, Mpio. de Compostela, Ago. 25, 1978, S. Martínez 1146 (MEXU); E de Tepic, en desviación a La Mojonera, Dic.13, 1968, V.E. Rudd 3010, P.M. Bauer y A.C. Fox (MEXU); JALISCO: 1 km de El Mirador, Jul.16, 1976, A. Delgado 273 (MEXU); 3 km N de El Tuito, Dic.16, 1977,

R. Grether 859 y H. Quero (MEXU; UAM-I); COLIMA: 2 km NE de Comala, camino a La Caja, Mpio. Comala, Nov.20, 1979, J.A.S. Magallanes 2062 (MEXU; UAM-I); MICHOACAN: La Tzaráracua, 6 km S de Uruapan, Dic.19, 1977, R. Grether 879 y H. Quero (MEXU; UAM-I); 18 km N de La Huacana, Sept.22, 1978, R. Grether 1119 y H. Quero (MEXU; UAM-I); cañón al W de Jiquilpan, carretera a Colima, Sept.23, 1952, R. Mc Vaugh 13221 (MEXU); GUERRERO: 1 km SW de Taxco, Sept.13, 1981, J.C. Soto y R. Torres 3145 (MEXU); OAXACA: 10 km NE de Oaxaca, camino a Guelatao, Sept.17, 1977, R. Grether 708 y H. Quero (MEXU; UAM-I); cerca de Tlapancingo, Dic.7, 1894, E.W. Nelson 2070 (US); 4 km W de El Vado, Distrito de Ejutla, Oct.19, 1977, M. Sousa et al. 8299 (MEXU; UAM-I); CHIAPAS: cerca del Aeropuerto de San Quintín, Río Jataté, Mpio. de las Margaritas, Feb.24, 1965, D.E. Breedlove 9188 (MEXU); 8 km E de Cintalapa, Dic.13, 1978, R. Grether 1212 y H. Quero (MEXU; UAM-I); 17 km N de Amatenango de la Frontera, camino de Motozintla a Comitán, Dic.13, 1979, R. Grether 1377 y H. Quero (MEXU; UAM-I); cañón del Sumidero, 18 km N de Tuxtla Gutiérrez, Dic.8, 1980, R. Grether 1496, H. Quero y R.W. Read (MEXU; UAM-I); 3 km N de Jiquipilas, Mpio. Cintalapa, Ene.5, 1982, R. Grether 1617, H. Quero y L. Lehtonen (MEXU; UAM-I); ESTADO DE MEXICO: Ixtapan, Distrito Temascaltepec, Sept.8, 1932, G.B. Hinton 1642 (MEXU); Tenancingo, Sept. 1886, M. Urbina sin No. (MEXU); MORELOS: 20 km NW de Cuautla, Ago.2, 1950, W. Fosbery 97 (MEXU); Rodeo, Sept. 1933, Hno. E. Lyonet 874 (MEXU); PUEBLA: 2 km S de Villa Avila Camacho, Mpio. Xicoteppec de Juárez, Dic.2, 1979, P. Basurto y G. Durán 446 (MEXU); TAMAULIPAS: a 8 mi de Tampico, sobre carretera a Ciudad Mante, Sept.27, 1959, J. Graham y M. C. Johnston 4061A (MEXU); SAN LUIS POTOSI: Hacienda de Tamasopo, Dic.11-16, 1891, C.G. Pringle 3970 (MEXU); VERACRUZ: Loma Iarga, Mpio. Catemaco, Feb.3, 1969, R. Cedillo Trigos 70 (MEXU); Tenexchapa, Salto de Eyipantla, Ene.23, 1967, M. Sousa 2957 (MEXU); TABASCO: km 8.6 de la desviación de Huimanguillo hacia Francisco Rueda, Mpio. Huimanguillo, Feb.18, 1980, P.C. Cowan 2770 (MEXU); carretera Cárdenas-Huimanguillo-Malpaso, desviación a Estación Ferrocarril Francisco Rueda, May.30, 1963, E. Hernández X. y P. Segalen 264 (MEXU); CAMPECHE: 1/2 km SE de Colonia Coahuila, al SE de Candelaria, Abr.13, 1980, R. Grether 1418 y H. Quero (MEXU; UAM-I); 1 km W de Castamay, km 12 carretera de Campeche a Mérida, Nov.28, 1980, R. Grether 1461 y H. Quero (MEXU; UAM-I); YUCATAN: Cayal, Feb.13, 1956, O.G. Enríquez 411 (MEXU); 21 km E de Tizimín, camino a Colonia Yucatán, Abr.23, 1978, R. Grether 936 y H. Quero (MEXU); QUINTANA ROO: 2 km S de Pucté, camino de Ucum a La Unión, Dic.29, 1976, R. Grether 540 y H. Quero (MEXU; UAM-I).

DISTRIBUCION EN MEXICO: De Sinaloa a Chiapas, en la vertiente del Pacífico; Estado de México, Morelos y Puebla, en el centro del país; de Tamaulipas a Tabasco, en la ver



Fig. 1. *Mimosa albida*, var. *pochutlensis*. a) Rama con cabezuelas globosas; b) Rama con frutos; c) Acercamiento de la flor y la bracteola; d) Gineceo.



Fig. 2. *Mimosa albida*, var. *pochutlensis*. Rama con cabezuelas.



Fig. 3. *Mimosa albida*, var. *pochutlensis*. Fruto hispido.

tiente del Golfo de México; Península de Yucatán.

Existen pocos datos de la presencia de látex lechoso en el género *Mimosa*, sin embargo, en el caso de *M. albida*, var. *strigosa*, hemos observado algunas poblaciones que producen látex abundante, cuando menos en ramas jóvenes, hojas e inflorescencias; ésto se ha observado en los estados de Veracruz, Oaxaca, Chiapas, Campeche y Yucatán.

Mimosa albida H. & B. ex Willd., var. *pochutlensis* R. Grether, var. nov.

A ceteris varietatibus legumine tantum hispido et foliolis majoribus margine setiferis brevibus, setis non adpressis et irregulariter dispositis differt.

Arbusto o árbol pequeño, 1-3 m de alto, armado con aguijones recurvados a inerme; ramas híspidas, tendiendo a glabras con la edad. Estípulas 2-5 mm de largo, lineares, a veces subuladas, puberulentas y setosas; folíolos hasta 11 cm de largo y hasta 6.5 cm de ancho, estrigosos y puberulentos en ambas superficies, margen con setas cortas, no adpresas, irregularmente dispuestas. Cabezuelas globosas; pedúnculos híspidos y puberulentos; bracteolas lineares, 1/3-1/2 de la longitud de la corola. Flores hermafroditas y estaminadas en la misma cabezuela; corola generalmente con 4 lóbulos, rara vez 5, glabra; estambres 4-5. Fruto hasta 3.5 cm de largo, hasta 1 cm de ancho, recto, 1-5 artejos, ápice mucronado a mucronulado o redondeado, estípite hasta 4 mm de largo, valvas y margen híspidos.

TIPO: MEXICO. OAXACA: Distrito de Pochutla, 17 km W de Pochutla, Dic. 18, 1978, R. Grether 1264 y H. Quero (HOLOTIPO: MEXU; ISOTIPOS: ENCB; GH; UAM-I; US; XAL).

MATERIAL ADICIONAL EXAMINADO:

MEXICO. OAXACA: Distrito de Jamiltepec: 11 km SW de Mancuernas, Ago. 20, 1976, M. Sousa et al. 5880 (ENCB; MEXU; UAM-I); La Estancia, W de Pinotepa Nacional, Ago. 20, 1976, M. Sousa et al. 5886 (MEXU); Distrito de Pochutla: Guatulco (Huatulco), Oct. 1842, Liebmann 4317 (US); alrededores de Finca "Las Pilas", Feb. 8, 1977, M. Sousa et al. 7147 (MEXU); 18 km W de Pochutla, Jun. 25, 1977, M. Sousa et al. 7611 (MEXU; UAM-I).

Mimosa albida, var. *pochutlensis* difiere de las otras variedades por el fruto híspido, sin otro tipo de tricomas y por los folíolos más grandes, cuyo margen tiene setas cortas, no adpresas e irregularmente dispuestas.

Esta nueva variedad y la variedad *aequatoriana*, no descrita en este trabajo, son las únicas variedades de

Mimosa albida que tienen fruto hispido; sin embargo, la variedad *pochutlensis* se distingue por el fruto ligeramente estipitado, hispido pero no pubescente y por la corola glabra.

Mimosa albida, var. *pochutlensis* crece en la planicie costera de Oaxaca, hasta ahora se ha colectado solamente en la región de Pochutla como un arbusto o arbolito abundante en selva baja caducifolia, al nivel del mar y en encinares a 500 msnm; además se ha encontrado en la región de Pinotepa Nacional, en los bordes de savanas, hasta los 200 m de altitud.

REFERENCIAS:

- BENTHAM, G. Revision of the Suborder Mimoseae. Trans. Linn. Soc. 30: 388-392. 1875.
- ROBINSON, B.L. Revision of North American and Mexican Species of *Mimosa*. Proc. Amer. Acad. 33: 310, 311. 1898.
- RUDD, V.E. *Mimosa albida* and its varieties. Phytologia 16(5): 435-441. 1968.

AGRADECIMIENTOS:

La autora desea expresar su agradecimiento al M.en C. Hermilo J. Quero del Jardín Botánico, UNAM y al M. en C. Mario Sousa del Depto. de Botánica, Instituto de Biología, UNAM por la revisión crítica del manuscrito, al Dr. Fernando Chiang del Depto. de Botánica, Instituto de Biología, UNAM por la revisión de la diagnosis en latín y al Consejo Nacional de Ciencia y Tecnología, ya que es te trabajo ha sido financiado en parte por el Convenio CONACYT: BID-UAM-I (Proyecto ICECBID-800914).

A NEW FORM OF HELIANTHUS FROM SOUTH FLORIDA

Fred W. Oswald

HELIANTHUS TUBEROSUS f. MOLDENKEANUS Oswald, f. nov.

Haec forma a forma typica species differt ad nodos folii inferiores stirpium crassorum incrementa tuberosa aerea fertilia formante; hi tubri aerii purpureo-rubri, plerumque nodosi, addimidia vivencia inferioria caulis principalis evolventes, postquam summa plantae emoriata, marcidata, ad solum delapsa. Tubri hypogaei base caulium fasciculati, rare rhizomata evolventes, nodis magnis acaulatis, pellibus cretaceis, subinde perpallide bruno-albis basibus, vel vividivirentibus suffusis quum ad vel prope superficies soli evolventes.

This form differs from the typical form of the species by forming tuberous, aerial, fertile growths on the lower leaf nodes of the thick stems. These aerial tubers are purple-red, usually nodose, developing in the living lower halves of the principal stems, after the tops of the dead, withered plants have fallen to earth. Hypogaeous tubers clustered at the bases of the stems, rarely developing rhizomes, with large stemless knobs, with skins China white, sometimes tinted very paley brownish-white or bright green when developing on or near the soil.*

Tall branching plants with leafy tops and abundant yellow flowers. Stems purple-red with stiff whitish hairs, the rough leaves green, becoming yellow then brown after seed heads form.

The original plant was discovered by the author on November 19, 1980. Utilizing this plant, the aerial tubers were removed from the stalks and planted, to remain dormant in the sandy soil until sprouting in May, 1981 to eventually develop into flowering, tuber-bearing plants. The below-ground tubers were also removed and replanted, to also appear at the same time, maturing true to form.

*For previously described forms see PHYTOLOGIA Vol. 44, No. 6, December 1979, page 419.

The root system containing the below-ground tubers and lower parts of the above-ground stem with the attached aerial tubers of this form were collected by the author on November 16, 1981; the flowering tops of this form were collected from marked plants by the author on September 1, 1982, (this later date due to the fact that the aerial tubers form after the flowering tops die), 300 feet south of State Road 78 and 155 feet east of Crescent Lake Drive, North Fort Myers, Lee County, Florida. The logotypes of this form are deposited in the Lundell Herbarium, University of Texas, Austin, Texas, as A. L. & H. N. Moldenke 31740 & 31741.

This sunflower is named in honor of Harold Norman Moldenke (1909-) as a token of appreciation for his many decades of furthering public interest, the author included, through all available media, giving countless hours of his own free time to teach the wonders and beauties of nature, and in their conservation, so vital for the continued preservation of our nation's wonderful natural resources.

NEW SPECIES OF JUSTICIA (ACANTHACEAE)
FROM VENEZUELA

Dieter C. Wasshausen
Department of Botany
Smithsonian Institution, Washington, D. C. 20560

Recent efforts to identify specimens of Justicia collected in Venezuela's Morrocoy National Park have resulted in the recognition of the following undescribed taxon.

JUSTICIA FALCONENSIS Wassh., sp. nov.

Frutex, caulibus subquadrangularibus glabris; foliorum lamina oblongo-elliptica vel ovata, breviter acuminata, basi angustata, subcoriacea, integra vel undulata, supra atrovirens, subtus hebetate viridis, glabra, cystolithis conspicuis; paniculae terminales, ramis in spicas compactas terminalibus, pedunculis et internodiis panicularum quadrangularibus, glabris vel parce puberulis; bracteae spicas subtendentes subulatae; bracteae flores subtendentes triangulares; calycis segmenta lineari-lanceolata; corolla aliquanto aurantiaca, puberula, labiis subaequalibus, labio superiore oblongo-ovato, apice rotundato, emarginato, labio inferiore patulo, 3-lobato, lobis rotundatis; stamina exserta, filamentis glabris, antherarum lobis superpositis, lobo inferiore breviter calcarato; ovarium glabrum.

Shrub 1.5-3 m high; stems erect or ascending, subquadrangular, the angles rounded, glabrous, the internodes 2-5 cm long; leaf blades oblong-elliptic to ovate, 5-10 cm long and 2-3.5 cm wide, short-acuminate (the tip obtuse), narrowed at base, subcoriaceous, entire or undulate, dark green above, dull green below, both surfaces glabrous, the costa and lateral veins (4-6 pairs) prominent, cystoliths prominent on both surfaces; petioles 0.5-1 cm long, glabrous, 2 mm thick; flowers borne in short, dense, axillary and terminal spikes, these borne in pairs or in threes, 1-4 cm long, and 8 mm broad, these forming an open terminal panicle to 6 cm long and 2 cm broad, the lowermost internodes of the panicle 1.5 cm long, the peduncles of the spikes 5 mm long, both the peduncles and the internodes of the panicle quadrangular and glabrous or sparingly puberulous, the nodes of the panicle bearing a pair of small leaves (their blades about 1.5 cm long and 1 cm wide); bracts subtending spikes subulate, 4 mm long, 0.75 mm wide at base, sparingly hirtellous, the hairs ascending, rigid, cystoliths numerous and conspicuous, bracts subtending flowers triangular, 1 mm long, 0.5 mm wide at base, acute, firm, sparingly hirtellous and ciliate, the hairs rigid, mostly straight; calyx 5 mm long, sparingly hirtellous and ciliate, the segments linear-lanceolate, 3 mm long and 1 mm wide at base, acute, bearing numerous minute cystoliths conspicuous under a lens; corolla from base to tip of

the lips, 3.5 mm long, puberulous, orange to orange-red, the tube 2 mm broad at base, expanding at 2 mm above base to 3.5 mm, the upper expanded portion cylindric, the upper lip erect, oblong-ovate, 14 mm long, 6 mm wide at base, 1 mm wide at rounded, emarginate tip, the lower lip spreading or recurved, elliptic, 4 mm wide, 3-lobed at tip, the lobes about 1.5 mm long and 1.5 mm wide, rounded; stamens exserted, equaling or slightly shorter than the corolla lips, the filaments glabrous, the anthers 3.5 mm long, 0.5 mm broad, glabrous, vertically attached to the connective, the lower lobe terminating in a blunt white spur 1 mm long, pollen grains 2-porate, bilateral, 38 u long and 24 u wide; pistil slightly shorter than the stamens, the stigma minute, rounded, bilobed, ovary glabrous; capsule clavate, 2.2 cm long, 4 mm broad, 4 mm thick, brownish, glabrous; seeds 4, brownish, orbicular, flattened, about 3 mm long and wide, 0.5 mm thick, muricate, the projections rounded.

Type. J. A. Steyermark & B. J. Manara 110969 (holotype US, isotype VEN), Venezuela, Falcon: Distrito Silva: Cerro Chichiriviche, along CANTV road above La Luisa, between Morrocoy and La Soledad, 20-50 m alt, 6 Sep 1974.

Distribution. Growing along densely forested dry slopes and in deciduous forest above line of small limestone bluffs in the state of Falcon, Venezuela, at elevation between 4-50 m. Distrito Silva: along S side of Golfete de Guare, SW of Isla Villalba and Chichiriviche, W of la Cueva de Los Indios, 31 Aug 1974, J. A. Steyermark & B. J. Manara 110502 (US, VEN); S of Punta Faustino, SE of Chichiriviche, 29 Aug 1974, J. A. Steyermark & B. J. Manara 110392 (US, VEN).

Justicia falconensis is not nearly allied to the other known species.



Fig. 1. *Justicia falconensis* Wassh.: A, habit, $\times \frac{1}{2}$; B, spike with bracts and calyces, $\times 3$; C, calyx, $\times 3$; D, corolla, $\times 1\frac{1}{2}$; E, corolla expanded, $\times 1\frac{1}{2}$.

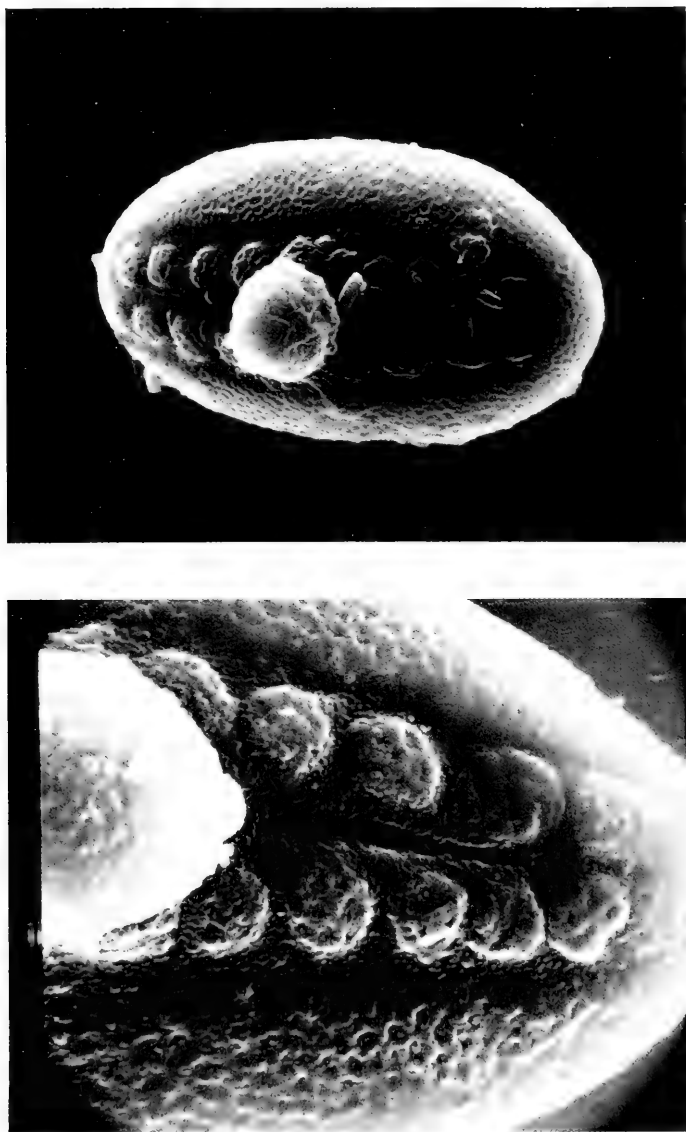


Fig. 2. Pollen grain of Justicia falconensis Washh., (J. A. Steyermark & B. J. Manara 110392); above, equatorial view, X 2000; below, surface view showing one row of insulae on either side of the aperture, X 3000.

DOS ESPECIES NUEVAS DE VIOLA (VIOLACEAE) DE LAS
MONTAÑAS DEL VALLE DE MÉXICO⁺

Graciela Calderón de Rzedowski⁺⁺
Laboratorio de Botánica Fanerogámica
Escuela Nacional de Ciencias Biológicas
Instituto Politécnico Nacional
11340 México, D.F.

SUMMARY

Viola hemsleyana and Viola beamanii are described and illustrated on the basis of specimens collected in higher parts of mountains surrounding the Valley of Mexico and in neighboring areas of central Mexico. Both species belong in the section Nomimium Ging., group Mexicanae (sensu W. Becker). The first species seems to be related to V. ciliata Benth., while the second is akin to the group formed by V. hookeriana HBK., V. nannei Polakowsky, V. chiapasiensis W. Bckr., V. seleriana W. Bckr. and V. guatemalensis W. Bckr.

Al comenzar a revisar la familia Violaceae para la preparación del segundo volumen de la "Flora Fanerogámica del Valle de México", se pudo notar que se presentarían algunos problemas para resolver, especialmente en el género Viola, cosa que sucede aún en la actualidad y a nivel mundial.

Las violetas silvestres del Valle de México están relativamente poco representadas en los herbarios y en las etiquetas de una gran proporción de los ejemplares se nota confusión en las determinaciones, de lo cual puede deducirse que el conocimiento de este género es defectuoso.

⁺Trabajo parcialmente subvencionado por el Consejo Nacional de Ciencia y Tecnología, en el marco del Proyecto "Flora y Vegetación del Valle de México".

⁺⁺Becario de la C.O.F.A.A. del Instituto Politécnico Nacional.

Parecen coincidir varios aspectos para esta situación:

1. Las diferencias para la separación de las especies son muy sutiles.
2. Las características de flor, fruto y semilla son importantes, pero suelen no ser tan útiles como lo son en la generalidad de las fanerógamas.
3. La época de floración es corta y precoz en el año y es frecuente que no se colecten estas plantas por no encontrarlas en flor en la época acostumbrada de lluvias.

En tal circunstancia, independientemente del examen del material de varios herbarios de México y Estados Unidos, se consideró la necesidad de hacer numerosas salidas al campo para observar las diferentes especies de Viola en su habitat, mismas que también se mantuvieron en vivo en el laboratorio el tiempo conveniente para seguir las observaciones.

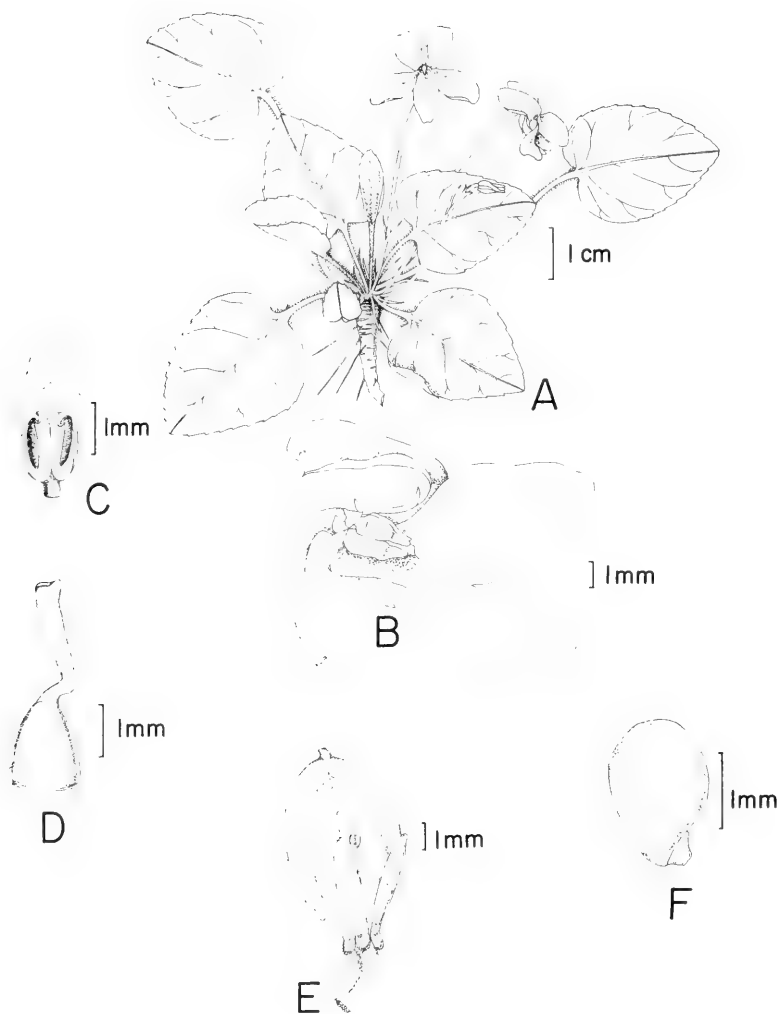
Como resultado de este estudio se llegó a las siguientes conclusiones:

- Que los rasgos más importantes para la separación de especies son: la presencia o ausencia de tallo evidente, de estolones y rizomas, características de las estípulas y de las hojas, color de la flor y forma del ápice del estilo.
- Que con base en las observaciones de campo, revisión de ejemplares de herbario y de bibliografía, quedó definida la presencia en el Valle de México de las siguientes especies: Viola ciliata Schl., V. hookeriana HBK., V. humilis HBK., V. painteri Rose & House y V. umbraticola HBK.
- Que además de las anteriores existe un par de especies propias de zonas altitudinales superiores a 3000 m, aparentemente nuevas para la ciencia y cuya descripción es el objeto del presente artículo;

Viola hemsleyana Calderón sp. n.

Herba perennis, glabra vel fere glabra, acaulis, usque ad 15 cm alta, stolonibus rhizomatibusque horizontalibus deficientibus; stipulae anguste lanceolatae, 6-18 mm longae, liberae vel ad petiolum minime basi affixae, laminae ovatae vel oblongae, usque ad 5 cm longae et 4 cm latae, sed plerumque minores, basi truncatae vel aliquot cordatae; pedunculi uniflori; sepala subaequalia, plerumque 5 mm longa; petala atroviolacea, rarissime alba venis violaceis, ca. 1 cm longa; antherae ca. 3 mm longae appendice apicali incluso; stylus basi sigmoideus, versus apicem incrassatus, apicis extremum truncatum, aliquot excavatum, subterminaliter rostellatum; fructus ca. 7 mm longus, ca. 5 mm latus; semina nigra, nitida, verruculosa, carunculata.

Planta herbácea perenne, glabra o casi glabra, acaule, sin estolones, hasta de unos 15 cm de alto; rizoma engrosado (en ocasiones corto, otras veces hasta de unos 7 cm de largo por 7 mm de grueso), del cual salen numerosas raíces fibrosas; estípulas estrechamente lanceoladas, de (6) 8 a 12 (18) mm de largo, libres o unidas al peciolo muy en su base, con el borde laciniado; peciolo de 1 a 4 (a veces hasta 9) cm de largo, cóncavo y densamente pubescente del lado del haz, glabro y convexo del lado del envés; láminas algo carnosas, ovadas a oblongas (arriñonadas u orbiculares en hojas tiernas), de (0.7) 1.5 a 3 (5) cm de largo por (0.7) 1 a 2.5 (4) cm de ancho, ápice redondeado a obtuso, borde crenado o dentado, con frecuencia ciliado, a veces con tendencia a ser entero hacia el ápice y más evidentemente dentado hacia la base, ésta por lo general truncada, a veces hasta profundamente cordada, venación evidente en ambas caras, glabras o casi glabras; pedúnculos unifloros de (2) 3 a 5 (6) cm de largo, glabros o poco pubescentes, bi-bracteados a la mitad de su largo o algo más abajo, brácteas opuestas, subopuestas, o a veces alternas, lanceoladas, de 3 a 6 (10) mm de largo, enteras o laciniadas, sobre todo cerca de su base; sépalos subiguales, de alrededor de 5 mm (raras veces hasta 8 mm) de largo, lanceolados a oblongos, algo espolonados en la base, estrechamente escariosos en el borde, con 3 neraduras longitudinales evidentes; pétalos morados, blancos en la base, con venas de color morado más obscuro, (en muy raras ocasiones son blancos con venas moradas) todos glabros o a veces los laterales -



Viola hemsleyana Calderón. A. Aspecto general de la planta; B. Flor vista de perfil, desprovista de dos de sus pétalos; C. Estambre; D. Pistilo; E. Fruto; F. Semilla.

con escasos pelos blancos acintados en su lado interno, cerca de la base, el pétalo inferior obovado, de 11 a 13 mm de largo por 6 a 8 mm en su parte más ancha, espolonado en la base, emarginado en el ápice, los laterales obovados, de 10 a 12 mm de largo por 5 a 6 mm en su parte más ancha, enteros en el ápice, los superiores semejantes a los laterales, pero a veces algo más anchos y con el ápice emarginado; anteras subsésiles, de unos 3 mm de largo, incluyendo el apéndice apical del conectivo que mide aproximadamente 1.5 mm de largo, las 2 anteras inferiores con apéndice dorsal, basal, carnoso, de color verdoso, más o menos cuadrado de 1 mm por lado; ovario en forma de botella prolongándose en un estilo sigmoideo en la base y que se va ensanchando hacia la punta, cuyo extremo es truncado, un poco excavado y con un pico subterminal; flores cleistógamas escasas, inconspicuas; fruto trigono-elipsoide, de 7 a 9 mm de largo por 5 a 7 mm de ancho; semillas ovoides, \pm 15 por fruto, de unos 2 mm de largo por alrededor de 1 mm de ancho, negras, brillantes, verruculosas, con carúncula evidente, blanquecina.

Tipo: MEXICO: ESTADO DE MEXICO: Villa Alpina, municipio de Naucalpan; en bosque de Pinus hartwegii y claros adyacentes; alt. 3100 m., 1-VII-1979, J. Rzedowski 36144 (ENCB).

Otros ejemplares revisados: MEXICO: MICHOACAN: Summit of Cerro San Andres, ca. 12 kms. (straight line distance) north of Ciudad Hidalgo; in open Pinus hartwegii forest; alt. 3589 m., 6-IX-1960, J. H. Beaman 4275 (MSC).

ESTADO DE MEXICO: Ojos de Agua, Nevado de Toluca; woods and open turf slopes; alt. 12000 ft., 12-VII-1938, E. K. Balls 5021 (MSC). Cerca del Puerto del Oso, municipio de Jiquipilco, al W de Santiago Tlazala; claros en medio del pinar; alt. 3500 m., 3-VI-1979, J. Rzedowski 36114 (ENCB). Palomas, municipio de Iturbide (Santiago Tlazala); pradera en medio del bosque de Pinus hartwegii; alt. 3400 m., 18-VII-1968, J. Rzedowski 25906 (ENCB). Ibid., 18-VII-1968, J. Rzedowski 25914 bis (ENCB). Ibid., 8-VI-1980, J. Rzedowski 36668 (ENCB). Alrededores de la Presa Iturbide, 6 km al WNW de Santiago Tlazala; bosque de Pinus hartwegii; alt. 3350 m., 7-VIII-1977,

J. Rzedowski 35113 (ENCB). Villa Alpina, municipio de Naucalpan; orilla de arroyo; alt. 3100 m., 2-VII-1978, J. Rzedowski 35681 bis (ENCB). Ibid., alt. 3150 m., 28-VIII-1979, J. Rzedowski 36320 (ENCB). Ibid., bosque de Pinus hartwegii y claros adyacentes; alt. 3100 m., 14-VI-1981, J. Rzedowski 37310 (ENCB). Municipio de Ixtapaluca, Estación Experimental de Investigación y Enseñanza de Zoquiapan, 8 km al S de Río Frío; bosque de Pinus hartwegii con abundancia de Penstemon gentianoides; alt. 3340 m., 6-VI-1975, S.D. Koch (y J.L. Magaña) 75156 (ENCB). Cerro Papayo, 6 km al S de Llano Grande, municipio de Ixtapaluca; bosque de Pinus hartwegii; alt. 3450 m., 5-VIII-1980, J. Rzedowski 36755 (ENCB). Llano Pinahua, 10 km al S del Llano Grande, municipio de Ixtapaluca; - claro en medio del bosque de Pinus hartwegii; alt. 3250 m., 12-VIII-1980, J. Rzedowski 36799 a. Llano Tepochaico, unos 10 km al SW de Río Frío, municipio de Ixtapaluca; claro en medio de pinares; alt. 3250 m., 7-VI-1981, J. Rzedowski 37301 (ENCB) (con flores blanco-moradas). Ibid., J. Rzedowski 37302 (ENCB). Iztaccihuatl, northwest side of mtn., above San Rafael; in grassy meadow at lower edge of timber line; alt. 3920 m., 15-VII-1959, J. H. Beaman 2825 (MSC). Iztaccihuatl, south side of mtn.; in black loam in grassy alpine meadow; alt. 3950 a 4000 m., 30-VII-1958, J. H. Beaman 1958 (?) (MSC). Joya de Alcalicán, extremo SSW del Iztaccihuatl, municipio de Amecameca; fondo de la depresión; alt. 3750 m., 29-VI-1980, J. Rzedowski 36691 (ENCB). 1 km al N de la Estación Re-transmisora de Televisión, cerca de Paso de Cortés; zacatonal alpino de Calamagrostis, Festuca y Muhlenbergia; alt. 3900 m., 10-IX-1966, R. Cruz 1176 (ENCB). Paso de Cortés; in grassy subalpine meadow in black sandy loam soil; alt. 3680 m., 17-IX-1958, J. H. Beaman 2591 (MSC). Parte baja del Cerro Xaltepec, cerca de Paso de Cortés, municipio de Amecameca; zacatonal de Muhlenbergia quadridentata; alt. 3700 m., 8-X-1966, R. Cruz s.n. (ENCB). Paso de Cortés, - entre el Popocatepetl y el Iztaccihuatl, municipio de Amecameca; bosque de Pinus hartwegii y pradera - adyacente; alt. 3650 m., 31-VIII-1979, J. Rzedowski 36329 (ENCB). Ibid., 29-V-1980, J. Rzedowski 36661 (ENCB).

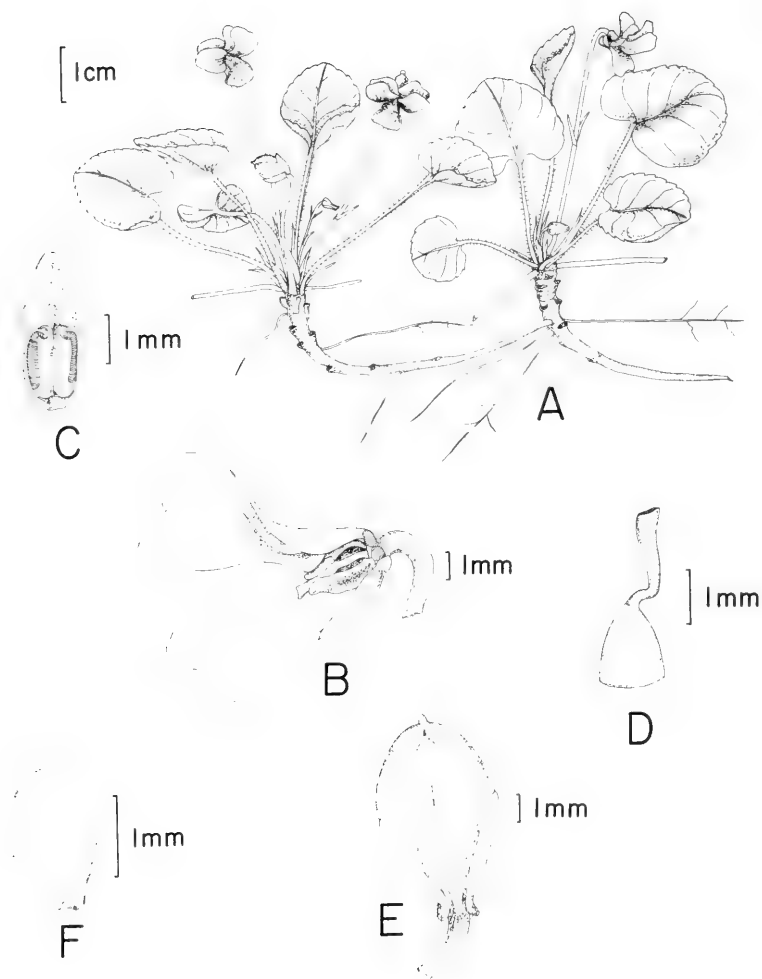
En el Valle de México las 2 especies más comunes de Viola son V. humilis y V. ciliata que habitan de preferencia en claros en medio de bosques de encinos y de coníferas, en altitudes entre 2500 y 3500 m. Ambas especies tienen flores blancas con venas moradas y se reproducen vegetativamente. Viola hemsleyana, en cambio, se distribuye entre 3150 y 4000 m de altitud, en medio del bosque de Pinus hartwegii y en praderas subalpinas y alpinas, destacando por sus flores moradas y ausencia de estolones y rizomas.

El nombre de la especie está dedicado a William Botting Hemsley (1843-1924), eminente estudioso de las plantas de México y Centro América, en ocasión del centenario de la publicación de la "Biologia Centrali Americana", cuya parte botánica estuvo a cargo de dicho autor. Esta obra ha sido, y sigue siendo, la base en muchos aspectos del conocimiento de la flora mexicana.

Viola beamanii Calderón sp. n.

Herba perennis, glabra vel fere glabra, acaulis, plerumque minus quam 4 cm alta, gregaria, rhizomata horizontalia ferens; stipulae liberae, lanceolatae, usque ad 7 mm longae, fimbriatae, interdum partitae, laminae orbiculares, reniformes vel cordiformes, plerumque latiores quam longiores, 1-1.5 cm longae, 1.2-2 cm latae, margine leviter et sparse crenatae, basi profunde cordatae; pedunculi uniflori; sepala subaequalia, ca. 4 mm longa; petala atroviolacea, ca. 1 cm longa; antherae 3-3.5 mm longae appendice apicali incluso; stylus sigmoides, versus apicem incrassatus, apex truncatus, in 3 foraminibus excavatus, rostello parvo; fructus ca. 6 mm longus, ca. 4 mm latus; semina matura atrobrunnea, caruncula parva, albida.

Planta glabra o casi glabra, a menudo casi rastrera, hasta de 4 cm (muy rara vez más) de alto, - creciendo por lo general en colonias densas; rizoma grueso, hasta de unos 5 mm de diámetro, vertical, - con raíces fibrosas, rizomas horizontales delgados frecuentes; estípulas libres, lanceoladas, de 5 a 7 mm de largo por 1 a 2 mm de ancho, fimbriadas a profundamente divididas sobre todo en el ápice; peciolas



Viola beamanii Calderón. A. Aspecto general de la planta; B. Flor vista de perfil, desprovista de dos de sus pétalos; C. Estambre; D. Pistilo; E. Fruto; F. Semilla.

de (0.8) 1 a 2 (3) cm de largo, a veces algo pubescentes por el lado del haz de la lámina, éstas orbiculares, reniformes o cordiformes, por lo general más anchas que largas, de 1 a 1.5 cm de largo por 1.2 a 2 cm de ancho, ápice por lo general redondeado, a veces ligeramente obtuso, borde leve y ampliamente crenado, base profundamente cordada, con los lóbulos de unos 4 mm (en una hoja de 18 mm de ancho); pedúnculo unifloro, de 1 a 4 cm de largo, bibracteado más o menos a la mitad de su largo, brácteas opuestas o subopuestas, lanceoladas, de unos 4 mm de largo; sépalos subiguales, anchamente lanceolados, de unos 4 mm de largo por 2.5 mm de ancho, con los bordes angostamente escariosos, algo espolonados en la base; pétalos de color morado obscuro, venosos, el inferior espolonado, de (8) 10 a 12 mm de largo, por 5.5 a 6 mm de ancho en el ápice que es emarginado, los superiores parecidos al inferior pero sin espolón, los laterales obovados, de unos 10 mm de largo por 4.5 mm de ancho, con el ápice entero o emarginado; anteras de 3 a 3.5 mm de longitud, incluyendo al apéndice apical que ocupa aproximadamente la mitad del largo total, las 2 anteras inferiores con apéndice dorsal algo trapezoidal, de 1 mm de largo por 1 mm de ancho, carnoso, verrucoso; ovario en forma de botella, estilo sigmoides, ensanchándose hacia el ápice que es truncado y excavado en 3 oquedades y con un pico pequeño; flores cleistógamas escasas, inconspicuas; fruto trigono-elipsoide, de 5 a 6 mm de largo por 3.5 a 4 mm de ancho; semillas entre 10 y 16 por fruto (en los ejemplares disponibles), ovoides, brillantes, de color crema en la juventud, a café obscuro en la madurez, de unos 2 mm de largo por 1 mm de ancho, carúcula pequeña, blanquecina.

Tipo: MEXICO: ESTADO DE MEXICO: Extremo SSW del Ixtaccíhuatl, parte alta de la Joya de Alcalican, municipio de Amecameca; pradera alpina; alt. 3900 m., 29-V-1980, J. Rzedowski 36662 (ENCB).

Otros ejemplares revisados: MEXICO: ESTADO DE MEXICO: Nevado de Toluca, north side of mtn., 2.0 mi. east of point where road goes above timberline; in black loam soil, hidden under clumps of grass in grassy, steep, narrow ravine; alt. ca. 4020 m., 28-VII-1958, J. H. Beaman 1935 (MSC, UC). Telapón

DISTRITO FEDERAL: Llano de la Cieneguilla, cerca del Cerro de la Palma, Sierra de las Cruces; orilla de arroyo; alt. 3500 m., 9-VII-1967, J. Rzedowski 23860 (ENCB). Desierto de los Leones, cercanías del paraje Tres Caminos, delegación de Cuajimalpa; bosque de Pinus hartwegii; alt. 3300 m., 5-IX-1979, J. Rzedowski 36350 (ENCB). Alrededores del Llano de la Cieneguilla, arriba del Desierto de los Leones; bosque de Pinus hartwegii; alt. 3400 m., 5-IX-1979, J. Rzedowski 36371 (ENCB).

Por el material revisado puede verse que esta especie existe en Michoacán, Estado de México y el Distrito Federal y que habita en la parte sur del Valle de México en altitudes entre 3100 y 3900 m., en pinares y claros adyacentes, en pastizales subalpinos, a veces cerca de los arroyos.

Viola hemsleyana pertenece a la sección Nomimium Ging., grupo Mexicanae (sensu W. Becker) y es con V. ciliata Schl. (que según nuestro parecer incluye a V. grahami Benth., V. reptans Rob. y V. schaffneriana W. Bckr.) la especie con la que parece estar más relacionada. A continuación se presenta un cuadro comparativo de algunas características de ambas especies.

	color de los pétalos	estolones	estípulas
<u>V. ciliata</u>	blanco con venas moradas	presentes, por lo menos temporalmente	libres o casi libres, de 1.5 a 3 cm de largo
<u>V. hemsleyana</u>	morado, muy rara vez blanquecino	ausentes	libres o unidas hasta un tercio de su largo, de 0.6 a 1.8 cm de largo.

(north of Iztaccihuatl); north side of mtn.; in area protected by large boulders, in black loam soil; alt. 3950 to 4000 m., 4-IX-1958, J. H. Beaman 2424 (MSC, MEXU). Iztaccihuatl, northwest side of mtn. above San Rafael; in grassy area on edge of road bank in Pinus hartwegii forest; alt. ca. 3770 m., 15-VII-1959, J. H. Beaman 2841 (MSC). Vertiente SW del Iztaccihuatl, 4 km al N de la Estación Retransmisora; ladera andesítica con vegetación de pradera de Calamagrostis y Festuca; alt. 3800 m., 15-VII-1965, - J. Rzedowski 20135 (ENCB). Joya de Alcalican, extremo SSW del Iztaccihuatl; pradera alpina; alt. 3900 m., 31-VIII-1979, J. Rzedowski 36338 (ENCB). Joya de Alcalican, extremo SSW del Iztaccihuatl, municipio de Amecameca; fondo de la depresión; alt. 3750 m., 29-VI-1980, J. Rzedowski 36690 (ENCB).

PUEBLA: Iztaccihuatl, south side of mtn.; in boulder crevices in alpine meadow; alt. 3960 m., 1-VIII-1958, J. H. Beaman 1998 (MSC). Iztaccihuatl, south side of mtn., ca. 6 kms. north of Paso de Cortes; in grassy meadow; alt. 3900 m., 18-VII-1959; J. H. Beaman 2872 (MSC).

Se trata de una planta escasa, pero localmente abundante (por lo menos en cuanto a las poblaciones de la Joya de Alcalican y sus alrededores), inconspicua durante la mayor parte del año, pues su estado en floración es muy corto.

Pertenece a la Sección Nomimium Ging., grupo Mexicanae (sensu W. Becker). Por sus hojas orbiculares o suborbiculares y flores de color morado, parece estar emparentada con V. hookeriana HBK., V. nannei Polakowski, V. chiapasiensis W. Bckr., V. seleriana W. Bckr. y V. guatemalensis W. Bckr. Se diferencia de todas estas especies por la siguiente combinación de caracteres: falta de estolones pero presencia de rizomas horizontales subterráneos mediante los cuales suele formar colonias compactas; hojas suborbiculares, o reniformes a cordiformes, de 1 a 1.5 cm de largo por 1.2 a 2 cm de ancho, redondeadas a algo obtusas en el ápice, borde leve y ampliamente crenado, peciolo pubescentes y láminas casi glabras.

La especie está dedicada al Dr. John H. Beaman, profesor de Michigan State University, quien durante varios años ha estado colectando e investigando sobre la flora de las altas montañas de México y Centro América.

A SIXTH SUMMARY OF THE VERBENACEAE, AVICENNIACEAE, STILBACEAE,
CHLOANTHACEAE, SYMPHOREMACEAE, NYCTANTHACEAE, AND ERIOCAULACEAE
OF THE WORLD AS TO VALID TAXA, GEOGRAPHIC DISTRIBUTION AND
SYNONYMY. SUPPLEMENT 2

Harold N. Moldenke

The original of this work (629 pp.) was published by me as PHYTOLOGIA MEMOIRS 2 in 1980 and was based, in part, on the examination of 246,814 herbarium specimens of these groups preserved in 320 private and institutional herbaria. A first supplement was issued on February 24, 1982, in PHYTOLOGIA 50: 233--270, based, in part, on 7,310 additional specimens examined. Since then no less than 5,692 new specimens have been turned over to me or have been sent to me by botanical collectors and by museum curators in many parts of the world, representing 5 additional herbaria. These have brought to light so many new geographic records and even new taxa, and concomitant literature study by my wife, Alma L. Moldenke, and myself has shown the necessity for so many changes in nomenclature and/or specific delimitations that it seems appropriate to publish this second supplement at this time. For substantiating data please consult my various papers on individual genera in this (and some other) journals.

I. Geographic distribution additions and emendations:

CANADA:

Ontario:

- Eriocaulon pellucidum* f. *pumilum* (Raf.) Mold. [Cochrane District]
- Verbena hastata* L. [Russell County; Parry Sound District; E.9 island]
- Verbena hastata* f. *caerulea* Mold. [Norfolk County]
- Verbena hastata* var. *scabra* Mold. [Algoma District]
- Verbena urticifolia* L. [Lincoln County]
- Verbena urticifolia* var. *leiocarpa* Perry & Fernald [Norfolk County]

New Brunswick:

- Eriocaulon pellucidum* f. *pumilum* (Raf.) Mold. [Westmoreland County]

UNITED STATES OF AMERICA:

New York:

- Eriocaulon parkeri* B. L. Robinson [Dutchess County]
- Eriocaulon pellucidum* Michx. [Cortland, Dutchess, Jefferson, & Rockland Counties]
- Verbena Xblanchardi* Mold. [Tompkins County]
- Verbena bracteata* Lag. & Rodr. [Richmond County]
- Verbena Xengelmannii* Mold. [Delaware, Madison, & Washington Counties]
- Verbena hastata* L. [Cayuga County; Chimney Island]
- Verbena hastata* f. *caerulea* Mold. [Washington County]

- Verbena hastata* f. *rosea* Cheney [Chemung County]
Verbena Xmoechina Mold. [Washington County]
Verbena simplex Lehm. [Cayuga County]
Verbena simplex f. *eggerti* (Mold.) Mold. [Bronx, Tompkins, & Washington Counties]
Verbena stricta Vent. [Cayuga, Onondaga, & Seneca Counties]
Verbena urticifolia L. [Cayuga & Otsego Counties]

New Jersey:

- Eriocaulon parkeri* B. L. Robinson [Gloucester & Salem Counties]

Maryland:

- Verbena Xengelmannii* Mold. [Baltimore County]

Virginia:

- Verbena hastata* L. [Bland County]
Verbena simplex Lehm. [Frederick County]
Verbena simplex f. *eggerti* (Mold.) Mold.
Verbena urticifolia L. [Princess Anne County]
Verbena urticifolia var. *leiocarpa* Perry & Fernald [Botetourt County]

North Carolina:

- Eriocaulon decangulare* L. [Hyde County]
Stylodon carneus (Medic.) Mold. [Columbus & Craven Counties]

South Carolina:

- Eriocaulon decangulare* f. *parviceps* Mold. [Bamberg & Horry Counties]
Lachnocaulon anceps (Walt.) Morong [Albemarle County]

Georgia:

- Callicarpa americana* L. [Early & Elbert Counties]
Clerodendrum indicum (L.) Kuntze [Mitchell County]
Eriocaulon decangulare L. [Calhoun & Lee Counties; Chesser Island]
Eriocaulon decangulare f. *parviceps* Mold. [Ben Hill, Charlton, Randolph, Tift, & Worth Counties]
Eriocaulon lineare f. *gigas* (Mold.) Mold. [Decatur County]
Lachnocaulon anceps (Walt.) Morong [Baker, Early, & Lanier Counties]
Lachnocaulon anceps f. *glabrescens* Mold. [Brooks County]
Lachnocaulon minus (Chapm.) Small [Baker & Early Counties]
Lantana camara f. *mista* (L.) Mold. [Baker & McDuffie Counties]
Lantana montevidensis (Spreng.) Briq. [Baker & Decatur Counties]
Stylodon carneus (Medic.) Mold. [Calhoun, Charlton, McIntosh, & Miller Counties]
Syngonanthus flavidulus (Michx.) Ruhl. [Cook & Tifts Counties; Billy's, Chesser, & Floyd's Islands]
Verbena bonariensis L. [Decatur, Dougherty, & Thomas Counties]
Verbena brasiliensis Vell. [Seminole County; Hutchinson's Island]
Verbena halei Small [Miller County]
Verbena rigida Spreng. [Seminole County]
Verbena scabra Vahl [Glynn County; Jekyll Island]
Verbena tenuisecta Briq. [Lee, Mitchell, & Seminole Counties]

Verbena urticifolia L. [Seminole County]

Verbena urticifolia var. *leiocarpa* Perry & Fernald [Decatur & Randolph Counties]

Florida:

Callicarpa americana L. [Sarasota County]

Eriocaulon compressum Lam. [Charlotte, Citrus, & Indian River Counties]

Eriocaulon decangulare f. *parviceps* Mold. [Lee County]

Eriocaulon lineare Small [Leon County]

Eriocaulon lineare f. *gigas* (Mold.) Mold. -- delete the asterisk

Lachnocaulon anceps (Walt.) Morong [Baker & Sarasota Counties]

Lachnocaulon glabrum Körn. [Brevard, DeSoto, & Sarasota Counties]

Lachnocaulon minus (Chapm.) Small [Suwannee County]

Lantana camara L. [Levy County; Cedar Key]

Lantana camara var. *aculeata* (L.) Mold. [Osceola County]

Lantana camara f. *splendens* (Medic.) Mold. [Sarasota County]

Lantana involucrata L. [Bahia Honda, Marco, Plantation, Sarasota, Sneeds, Sugarloaf, & Treasure Keys]

Lantana involucrata var. *odorata* (L.) Mold. [Collier & Hillsborough Counties; Longboat Key]

Lantana montevidensis (Spreng.) Briq. [Sarasota County; Siesta Key]

Lantana ovatifolia Britton [Anclote Key]

Lantana ovatifolia f. *parvifolia* Mold. [Dade County]*

Lantana urticoides Hayek [Collier & Manatee Counties]

Phyla nodiflora (L.) Greene [Little Torch Key]

Stylodon carneus (Medic.) Mold. [Dixie & Sumter Counties]

Syngonanthus flavidulus (Michx.) Ruhl. [Indian River County]

Verbena canadensis (L.) Britton [Indian River County]

Verbena maritima Small [Okeechobee County]

Verbena scabra Vahl [Sarasota County]

Verbena tampensis Nash [Flagler & Martin Counties]

Verbena urticifolia L. [Gadsden County]

Alabama:

Eriocaulon decangulare f. *latifolium* (Chapm.) Mold. [Houston County]

Eriocaulon decangulare f. *parviceps* Mold. [Baldwin & Washington Counties]

Eriocaulon lineare f. *gigas* (Mold.) Mold. [Covington County]

Lachnocaulon anceps (Walt.) Morong [Coffee & Covington Counties]

Stylodon carneus (Medic.) Mold. [Autauga & Henry Counties]

Syngonanthus flavidulus (Michx.) Ruhl. [Washington County]

Verbena bonariensis L. [Montgomery County]

Verbena simplex Lehm. [Colbert County]

Mississippi:

Verbena simplex f. *eggerti* (Mold.) Mold. [Oktibbeha County]

Ohio:

Phyla lanceolata (Michx.) Greene [Pickaway County]

Verbena hastata L. [Pickaway County]

- Verbena simplex* Lehm. [Pickaway County]
- Illinois:
Verbena Xperriana Mold. [LaSalle County]
- Indiana:
Verbena Xperriana Mold. [Floyd County]
- Iowa:
Verbena bracteata Lag. & Rodr. [Harrison County]
Verbena urticifolia L. [Dickinson County]
- Kentucky:
Verbena Xmoechina Mold. [Shelby County]
Verbena simplex f. *eggerti* (Mold.) Mold. [Trimble County]
Verbena urticifolia var. *leiocarpa* Perry & Fernald [Madison County]
- Tennessee:
Verbena canadensis (L.) Britton [Williamson County]
- Michigan:
Eriocaulon pellucidum Michx. [Berrien County]
Verbena bracteata Lag. & Rodr. [Alger, Antrim, Kent, Schoolcraft, & Washtenaw Counties]
Verbena Xdeamii Mold. [Ottawa County]
Verbena hastata L. [Delta, Iron, Kalkaska, Muskegon, Oscoda, & Sanilac Counties; High Island]
Verbena hastata f. *caerulea* Mold. [Montcalm County]
Verbena simplex Lehm. [Chippewa County; Drummond Island]
Verbena simplex f. *eggerti* (Mold.) Mold. [Chippewa County; High Island]
Verbena stricta Vent. [Berrien, Van Buren, & Wexford Counties]
Verbena urticifolia L. [Branch & Jackson Counties]
Verbena urticifolia var. *leiocarpa* Perry & Fernald [Alger County]
- Wisconsin:
Verbena bracteata Lag. & Rodr. [Door County]
- Minnesota:
Eriocaulon pellucidum Michx. [Saint Clair County]
Verbena hastata L. [Lincoln County]
- South Dakota:
Verbena bipinnatifida Nutt. [Jones County]
Verbena stricta Vent. [Butte & Jones Counties]
- Kansas:
Verbena bipinnatifida Nutt. [Hidalgo County]
- Missouri:
Verbena Xblanchardi Mold. [Lincoln County]
Verbena Xperriana Mold. [Greene County]
- Arkansas:
Callicarpa americana L. [White County]
Verbena bonariensis L. [Cleveland County]
Verbena Xrydbergii Mold. [Stone County]
- Louisiana:
Lachnocaulon anceps f. *glabrescens* Mold. [Beauregard Parish]
Phyla nodiflora var. *reptans* (Spreng.) Mold. [St. Mary Parish]
Verbena canadensis (L.) Britton [Calcasieu & West Baton Rouge Parishes]

Verbena delticola Small [Ascension Parish]
Verbena polyantha (Umber) Mold. [Cameron Parish]

Montana:

Verbena bracteata Lag. & Rodr. [Big Horn & Hill Counties]

Wyoming:

Phyla cuneifolia (Torr.) Greene [Goshen County]
Verbena bracteata Lag. & Rodr. [Rosebud & Sweetbrier Counties]
Verbena hastata L. [Sheridan County]

Utah:

Verbena hastata L. [Tooele County]

Nevada:

Verbena canescens H.B.K. -- to be deleted
Verbena stricta Vent. [Elko County]

Colorado:

Caryopteris incana (Thunb.) Miq. [Boulder County]
Verbena bracteata Lag. & Rodr. [Yuma County]

Nebraska:

Verbena hastata L.

Oklahoma:

Verbena ciliata Benth. [Cleveland County]

Texas:

Aloysia gratissima (Gill. & Hook.) Troncoso [Starr County]
Aloysia macrostachya (Torr.) Mold. [Cameron County]
Callicarpa americana L. [Refugio County]
Citharexylum brachyanthum (A. Gray) A. Gray [Caldwell County]
Lantana macropoda Torr. [Caldwell & Jeff Davis Counties;
Green Island]
Lantana macropoda f. *parvula* Mold. [Brewster, Cameron, & Webb
Counties]
Lantana urticoides Hayek [Robertson County]
Lantana urticoides var. *hispidula* Mold. [Refugio County]
Lippia alba (Mill.) N. E. Br. [Montague County]
Lippia alba f. *intermedia* Mold. [Cameron & Hidalgo Counties]
Phyla Xiintermedia Mold. [Jefferson County]
Phyla lanceolata (Michx.) Greene [Jasper County]
Phyla nodiflora var. *incisa* (Small) Mold. [Bexar, Brazos,
Dallas, & Refugio Counties]
Verbena ambrosifolia f. *eglandulosa* Perry [Potter County]
Verbena ciliata var. *longidentata* Perry [Aransas County]
Verbena gooddingii Briq. [Hidalgo County]
Verbena halei Small [Menard County]
Verbena Xperriana Mold. [Wharton County]
Verbena pumila Rydb. [Pecos County]
Verbena runyoni Mold. [Webb County]
Verbena verecunda (Umber) Mold. [Hidalgo, Jim Hogg, & Potter
Counties]

New Mexico:

Aloysia wrightii (A. Gray) Heller [Taos County]
Lantana macropoda Torr. [Dona Ana County]
Lippia graveolens H.B.K. [Dona Ana County]
Phyla cuneifolia (Torr.) Greene [Curry County]
Verbena ambrosifolia Rydb. [Valencia County]

Verbena wrightii A. Gray [Lea County]

Arizona:

Lantana urticoides Hayek [Pima County]
Verbena ambrosifolia f. *eglandulosa* Perry [Graham County]
Verbena ciliata var. *pubera* (Greene) Perry [Yuma County]
Verbena cloverae Mold. [Pima County]
Verbena neomexicana (A. Gray) Small [Pinal County]

California:

Lantana montevidensis (Spreng.) Briq. [Santa Barbara County]
Lantana notha Mold. [Santa Barbara County]
Phyla nodiflora var. *canescens* (H.B.K.) Mold. [Contra Costa County]
Phyla nodiflora var. *texensis* Mold. [Butte & Contra Costa Counties]
Verbena bracteata Lag. & Rodr. [Mariposa County]
Verbena lasiostachys f. *albiflora* Mold. [Tuolumne County]
Verbena lasiostachys f. *septentrionalis* (Mold.) Mold. [Merced County]

MEXICO:

Aegiphila deppeana Steud. [Tabasco]
Aloysia triphylla (L'Hér.) Britton [Hidalgo & Michoacán]
Citharexylum glabrum (S. Wats.) Greenm. [México & Oaxaca]
Citharexylum jurgenseni Briq. [Chiapas]
Citharexylum spathulatum Mold. & Lundell [Querétaro]
Lantana achyranthifolia f. *grandifolia* Mold. [Nayarit]
Lantana achyranthifolia f. *lilacina* Mold. [México]
Lantana camara var. *aculeata* (L.) Mold. [Nayarit]
Lantana camara f. *mista* (L.) Mold. [Tabasco]
Lantana camara f. *parvifolia* Mold. [Quintana Roo]
Lantana camara f. *splendens* (Medic.) Mold. [Sinaloa]
Lantana frutilla f. *grossidentata* Mold. [Puebla]*
Lantana frutilla var. *longipes* Mold. [Morelos]
Lantana frutilla var. *velutina* Mold. [Querétaro]
Lantana glandulosissima f. *parvifolia* Mold. [Jalisco, Morelos, Sinaloa, & Yucatán], delete the asterisk
Lantana hispida H.B.K. [Zacatecas]
Lantana hispida f. *parvifolia* Mold. [Jalisco, Nayarit, & Nuevo León]
Lantana horrida H.B.K. [Chihuahua & Querétaro]
Lantana horrida f. *inermis* Mold. [Tamaulipas & Yucatán]*
Lantana macropoda f. *parvula* Mold. [Jalisco]
Lantana trifolia L. [Hidalgo]
Lippia alba f. *intermedia* Mold. [San Luis Potosí & Tamaulipas]
Lippia alba f. *scabra* Mold. [Colima & Jalisco]*
Lippia chiapasensis Loes [Durango, Michoacán, Nayarit, & Sinaloa]
Lippia curtisiana Mold. [Durango]
Lippia durangensis Mold. [Chihuahua]
Lippia graveolens f. *loeseneriana* Mold. [Chiapas & San Luis Potosí]*
Lippia graveolens f. *macrophylla* Mold. [Hidalgo, San Luis Potosí, & Zacatecas]

- Lippia graveolens* f. *microphylla* Mold. [Sinaloa]
Lippia substrigosa Turcz. [Oaxaca]
Lippia yucatana Loes. [Distrito Federal]
Petrea volubilis L. [Morelos]
Phyla nodiflora var. *canescens* (H.B.K.) Mold. [Oaxaca]
Priva grandiflora (Ort.) Mold. [Querétaro]
Priva lappulacea (L.) Pers. [Puebla]
Priva lappulacea f. *albiflora* Mold. [Tabasco]
Stachytarpheta cayennensis (L. C. Rich.) Vahl [Chiapas & Quintana Roo]
Stachytarpheta incana Mold. [Quintana Roo]
Verbena ambrosifolia f. *eglandulosa* Perry [Jalisco]
Verbena bipinnatifida Nutt. [San Luis Potosí]
Verbena elegans H.B.K. [Guerrero]
Verbena litoralis f. *albiflora* Mold. [Chiapas]
Verbena verecunda (Umber) Mold. [Oaxaca & Tamaulipas]
Xolocotzia asperifolia Miranda -- delete the asterisk

MEXICAN OCEANIC ISLANDS:

- Lantana horrida* H.B.K. [Maria Madre]

GUATEMALA:

- Citharexylum crassifolium* Greenm. [El Quiché]
Cornutia latifolia (H.B.K.) Mold. [Quezaltenango]
Cornutia lilacina var. *velutina* Mold. [Chiquimula & San Marcos]
Lantana camara L. [Sololá]
Lantana camara f. *mista* (L.) Mold. [San Marcos]
Lantana glandulosissima f. *parvifolia* Mold. [Amatitlán]
Lantana hirta Grah. [Escuintla & Quezaltenango]
Lantana hispida H.B.K. [Alta Verapaz, Escuintla, & Sololá]
Lantana hispida f. *parvifolia* Mold. [Escuintla, Guatemala, & Sololá]
Lantana maxima Hayek [Alta Verapaz & Izabal]
Lippia alba (Mill.) N. E. Br. [Guatemala]
Lippia alba f. *intermedia* Mold. [Alta Verapaz & Sololá]
Lippia cardiostegia Benth. [Amatitlán]
Lippia cardiostegia f. *skutchii* Mold. [El Quiché]*
Lippia chiapasensis Loes. [Amatitlán]
Lippia myriocephala Schlecht. & Cham. [Amatitlán & Sololá]
Lippia substrigosa Turcz. [Sacatepéquez]
Phyla strigulosa var. *sericea* (Kuntze) Mold. [El Petén]
Priva lappulacea (L.) Pers. [San Marcos]
Stachytarpheta jamaicensis f. *atrocoerulea* Mold. [El Petén]
Verbena carolina f. *hirsuta* (Mart. & Gal.) Mold. [Guatemala]

BELIZE:

- Lippia graveolens* H.B.K.
Stachytarpheta belizensis Mold.*

HONDURAS:

- Aegiphila elata* Sw. [Colon & Gracias a Díos]
Bouchea prismatica (L.) Kuntze [Yoro]
Citharexylum affine D. Don [Choluteca]
Citharexylum cooperi Standl. [San Marcos]
Cornutia grandifolia (Schlecht. & Cham.) Schau. [El Paraíso]

- Cornutia pyramidata* var. *isthmica* Mold. [Cortés]
Duranta repens L. [Morazán]
Duranta repens f. *alba* (Masters) Matuda [Morazán]
Duranta repens f. *integrifolia* (Tod.) Mold. [Gracias a Díos & Morazán]
Ghinia spicata (Aubl.) Mold. [Gracias a Díos]
Lantana achyranthifolia Desf. [Copán]
Lantana camara L. [Colon]
Lantana camara var. *moritziana* (Otto & Dietr.) López-Palcios [Morazán]
Lantana hispida H.B.K. [Santa Barbara]
Lantana hispida f. *parvifolia* Mold. [Morazán]
Lantana trifolia f. *hirsuta* Mold. [El Paraíso & Santa Barbara]
Lantana trifolia f. *oppositifolia* Mold. [Atlántida]
Lantana velutina Mart. & Gal. [Lempira]
Lippia alba (Mill.) N. E. Br. [Colon]
Lippia callicarpaefolia H.B.K. [Copán]
Lippia graveolens f. *microphylla* Mold. [El Paraíso]
Lippia myriocephala var. *hypoleia* (Briq.) Mold. [Ocotepeque]
Phyla betulaefolia (H.B.K.) Greene [Atlántida]
Phyla scaberrima (A. L. Juss.) Mold. [Atlántida, Cortés, & Jutiapa]
Phyla strigulosa var. *sericea* (Kuntze) Mold. [Morazán & Yoro]
Priva lappulacea (L.) Pers. [Ocotepeque]
Priva lappulacea f. *albiflora* Mold. [Yoro]
Stachytarpheta frantzii Polak. [Gracias a Díos]
Stachytarpheta jamaicensis f. *atrocoerulea* Mold. [Colon]
Stachytarpheta urticaefolia (Salisb.) Sims [Cortés]
Verbena carolina f. *hirsuta* (Mart. & Gal.) Mold. [Morazán]
Xolocotzia asperifolia Miranda [El Paraíso]

BAY ISLANDS:

- Lantana involucrata* var. *odorata* (L.) Mold. [Roatán]

EL SALVADOR:

- Bouchea nelsonii* Grenz. [La Libertad]
Lantana glandulosissima f. *parvifolia* Mold. [Sonsonate]
Lantana maxima Hayek [San Salvador]
Lantana trifolia var. *rigidiuscula* Briq. [San Salvador]
Lippia alba (Mill.) N. E. Br. [La Libertad]
Lippia myriocephala Schlecht. & Cham. [Ahuachapán]
Lippia substrigosa Turcz. [Ahuachapán]
Lippia umbellata Cav. [San Salvador]
Phyla scaberrima (A. L. Juss.) Mold. [Ahuachapán]
Stachytarpheta frantzii Polak. [La Libertad]

NICARAGUA:

- Clerodendrum philippinum* f. *multiplex* (Sweet) Mold. [Esteli & Jinotega]
Lantana camara L. [Ometepe Island]
Lantana glandulosissima f. *parvifolia* Mold. [Granada]
Lippia alba f. *intermedia* Mold.
Lippia cardiostegia Benth. [Madriz]

COSTA RICA:

- Avicennia germinans* f. *aberrans* Mold. [Puntarenas]

Citharexylum viride Mold. [Alajuela]
Duranta repens L.
Lantana camara var. *aculeata* (L.) Mold. [Guanacaste]
Lantana camara f. *mista* (L.) Mold. [Puntarenas]
Lantana trifolia f. *hirsuta* Mold. [Alajuela]
Lippia alba f. *intermedia* Mold.
Petrea aspera Turcz. [Puntarenas]
Stachytarpheta mutabilis var. *violacea* Mold. [Heredia]

PANAMA:

Aegiphila cephalophora Standl. [Panamá]
Aegiphila costaricensis Mold. [Coclé]
Aegiphila elata Sw. [Chiriquí]
Aegiphila martinicensis Jacq. [Coclé, Colón, & Veraguas]
Avicennia bicolor Standl. [Panamá]
Avicennia germinans (L.) L. [San Blas]
Avicennia germinans var. *guayaquilensis* (H.B.K.) Mold. [Canal Zone]
Callicarpa acuminata H.B.K. [Veraguas]
Clerodendrum philippinum f. *multiplex* (Sweet) Mold. [Veraguas]
Cornutia grandifolia (Schlecht. & Cham.) Schau. [Herrera]
Duranta repens f. *integrifolia* (Tod.) Mold. [Canal Zone & Coclé]
Ghinia spicata (Aubl.) Mold. [Colón & Panamá]
Holmskioldia sanguinea Retz. [Panamá]
Lantana camara var. *aculeata* (L.) Mold. [Coclé]
Lantana camara f. *mista* (L.) Mold. [Veraguas]
Lantana camara var. *moritziana* f. *parvifolia* (Mold.) López-Palacios [Colón]
Lantana glandulosissima f. *parvifolia* Mold. [Panamá]
Lantana hirta Grah. [Herrera]
Lantana trifolia L. [Darién]
Lantana trifolia f. *albiflora* Mold. [Bocas del Toro]
Lantana trifolia f. *hirsuta* Mold. [Chiriquí]
Lantana trifolia f. *oppositifolia* Mold. [Chiriquí, Herrera, & Veraguas]
Lippia callicarpaefolia H.B.K. [Chiriquí]
Lippia controversa Mold. [Coclé]
Petrea aspera Turcz. [Coclé & Panamá]
Priva lappulacea (L.) Pers. [Herrera]
Stachytarpheta cayennensis (L. C. Rich.) Vahl [Darién]
Verbena parvula Hayek [Chiriquí]

BAHAMA ISLANDS:

Duranta repens f. *integrifolia* (Tod.) Mold. [Greater Abaco]
Petitia domingensis Jacq. [Greater Abaco]
Phyla nodiflora (L.) Greene [South Bimini]
Stachytarpheta jamaicensis (L.) Vahl [Greater Abaco]

TURKS AND CAICOS ISLANDS:

Lantana camara f. *rubella* Mold. [South Caicos]

CUBA:

Lantana cubensis Mold. [Havana]
Lantana reticulata f. *albiflora* Mold. [Las Villas]
Verbena domingensis var. *cubensis* Mold. [Havana & Matanzas]

Verbena officinalis L. -- to be deleted

ISLA DE PINOS:

Lantana camara f. *mutabilis* (Hook.) Mold.

HISPANIOLA:

Lantana arida var. *portoricensis* Mold. [Haiti]

Lantana camara var. *moritziana* (Otto & Dietr.) López-Palacios.
[Dominican Republic]

Lantana camara f. *sanguinea* (Medic.) Mold. [Dominican Republic]

Lippia alba f. *intermedia* Mold. [Dominican Republic & Haiti]

Lippia alba f. *macrophylla* Mold. [Haiti]

Verbena alainii Mold. [Dominican Republic]*

Verbena domingensis var. *cubensis* Mold. [Dominican Republic]

HISPANIOLAN OFFSHORE ISLANDS:

Lantana ehrenbergiana Mold. [Tortue]

Lantana reticulata L. [Tortue]

Lippia alba f. *intermedia* Mold. [Tortue]

Lippia alba f. *macrophylla* Mold. [Tortue]

Phyla nodiflora (L.) Greene [Tortue]

PUERTO RICO:

Lantana arida var. *portoricensis* Mold. -- delete the asterisk

Verbena litoralis H.B.K.-- to be deleted

Verbena litoralis var. *portoricensis* Mold.*

VIRGIN ISLANDS:

Duranta repens f. *microphylla* (Desf.) Mold. [St. Croix]

Stachytarpheta urticaefolia (Salisb.) Sims [St. Croix]

WINDWARD ISLANDS:

Lippia alba f. *intermedia* Mold. [Martinique]

SOUTHERN NETHERLANDS ANTILLES:

Lantana camara var. *moritziana* f. *parvifolia* (Mold.) López-Palacios [Curaçao]

NORTHERN SOUTH AMERICAN ISLANDS:

Lantana camara var. *moritziana* f. *parvifolia* (Mold.) López-Palacios [San Andres]

COLOMBIA:

Aegiphila grandis Mold. [Chocó]

Clerodendrum ternifolium var. *velutinosum* Mold. [Atlántico]

Lippia schlimii Turcz. [Boyacá]

Lantana camara L. [Meta]

Lantana camara var. *moritziana* f. *aculeifera* Mold. [Boyacá & Cundinamarca]*

Lantana camara var. *moritziana* f. *parvifolia* (Mold.) López-Palacios [Atlántico, Bolívar, El Valle, & Huila]

Lantana cujabensis var. *hispida* Mold. [Cauca, Cundinamarca, El Valle, & Santander]

Lantana cujabensis var. *parvifolia* Mold. [Cauca]

Paepalanthus lodiculoides var. *floccosus* Mold. [Arauca]

Paepalanthus pilosus (H.B.K.) Kunth [Santander]

Syngonanthus humboldtii var. *glabrescens* Mold. [Meta]

VENEZUELA:

Aegiphila costaricensis Mold. [Táchira]

Aegiphila deppeana Steud. [Táchira]

- Aegiphila hirsutissima* Mold. [Táchira]
Clerodendrum ternifolium var. *serratifolium* Mold. [Zulia]*
Clerodendrum ternifolium var. *velutinosum* Mold. [Zulia]
Cornutia microcalycina var. *puberulenta* Mold. [Zulia]
Eriocaulon klotzschii Mold. [Amazonas]
Lantana camara var. *moritziana* f. *parvifolia* (Mold.) López-Palacios [Amazonas & Lara]
Lantana camara f. *parvifolia* Mold. [Zulia]
Lantana cujabensis Schau. [Apure]
Lantana fucata f. *albiflora* Mold. [Zulia]
Lantana trifolia f. *oppositifolia* Mold. [Yaracuy]
Paepalanthus andicola var. *villosus* Mold. [Trujillo]
Paepalanthus brunneus Mold. [Amazonas]
Paepalanthus convexus var. *parvicephalus* Mold. [Amazonas]*
Paepalanthus convexus var. *strigosus* Mold. [Amazonas]
Paepalanthus jauensis Mold. [Amazonas]
Paepalanthus jauensis var. *caulescens* Mold. [Amazonas]
Paepalanthus meseticola Mold. & Steyerl. [Amazonas]
Paepalanthus viscosus Mold. [Amazonas]
Petrea arborea H.B.K. [Táchira]
Petrea arborea f. *broadwayi* (Mold.) Mold. [Zulia]
Petrea macrostachya Benth. [Amazonas]
Stachytarpheta angustifolia var. *elatior* (Schrad.) López-Palacios [Zulia]
Syngonanthus bellus Mold. [Amazonas]
Syngonanthus cowani var. *involucratu*s Mold. [Amazonas]*
Syngonanthus cowani var. *simplex* Mold. [Amazonas]*
Syngonanthus duidae var. *longifolius* Mold. [Bolívar]*
Syngonanthus glandulosus f. *epapillosus* Mold. [Apure]
Syngonanthus philodicoides (Körn.) Ruhl. [Amazonas]
Syngonanthus tenuis var. *minor* Mold. -- delete the asterisk
Syngonanthus xeranthemoides var. *angustifolius* Mold. [Amazonas]*
Vitex capitata Vahl [Zulia]
Vitex compressa f. *angustifolia* Mold. [Miranda & Zulia]
Vitex cymosa Bert. [Trujillo]
Vitex orinocensis H.B.K. [Apure & Barinas]
Vitex orinocensis var. *multiflora* (Miq.) Huber [Zulia]
Vitex polygama var. *bakeri* Mold. [Amazonas]
Vitex stahelii Mold. [Amazonas & Falcón]

GUYANA:

- Amasonia lasiocaulos* var. *macrophylla* Mold.
Eriocaulon klotzschii Mold.
Petrea candolleana Schau.*
Petrea longifolia Mold.
Petrea martiana Schau.
Petrea schomburgkiana Schau.
Syngonanthus gracilis var. *aureus* Ruhl.

SURINAM:

- Amasonia campestris* var. *surinamensis* Mold. -- delete the asterisk
Paepalanthus viscosus Mold. -- delete the asterisk

Petrea macrostachya Benth.
Petrea martiana Schau.
Petrea schomburgkiana Schau.

FRENCH GUIANA:

Aegiphila sellowiana Cham.
Amasonia campestris var. *surinamensis* Mold.
Amasonia lasiocaulos Mart. & Schau.
Lantana armata var. *guianensis* Mold.*
Lippia alba f. *intermedia* Mold.
Paepalanthus bifidus f. *brevipes* Mold.
Paepalanthus fasciculatus f. *sphaerocephalus* Herzog
Paepalanthus leucocyaneus Tutin
Paepalanthus leucocyaneus f. *egleri* Mold.
Petrea longifolia Mold.
Petrea martiana var. *glabrescens* Mold.
Petrea schomburgkiana Schau.
Stachytarpheta mutabilis (Jacq.) Vahl
Syngonanthus caulescens f. *longifolius* Mold.*
Syngonanthus gracilis var. *hirtellus* (Steud.) Ruhl.
Syngonanthus macrocaulon Ruhl.
Tonina fluviatilis f. *parvifolia* Mold.

ECUADOR:

Aegiphila alba Mold. [Cotopaxi]
Aloysia dodsoniorum Mold. [Guayas]*
Aloysia scorodonioides var. *mathewsii* (Briq.) Mold. [Imbabura]
Aloysia triphylla (L'Hér.) Britton [Azuay]
Avicennia germinans (L.) L. [Esmeraldas]
Duranta sprucei var. *cotopaxiensis* Mold. [Cotopaxi]*
Eriocaulon microcephalum H.B.K. [Santiago-Zamora]
Lantana camara var. *aculeata* (L.) Mold. [Azuay]
Lantana camara f. *mista* (L.) Mold. [Los Ríos]
Lantana cujabensis Schau. [Guayas]
Lantana cujabensis var. *hispida* Mold. -- delete the asterisk
Lantana ferreyrae var. *brevipedunculata* Mold. [Guayas]*
Lantana pastazensis Mold. [Pastaza]*
Lantana trifolia L. [Moreno-Santiago]
Phyla nodiflora (L.) Greene [Esmeraldas]
Stachytarpheta straminea Mold. [Cotopaxi]
Verbena glabrata H.B.K. [Carchi]

PERU:

Aegiphila cordifolia (Ruiz & Pav.) Mold. [Madre de Dios]
Aegiphila haughtii Mold. [Amazonas]
Aegiphila hoehnei Mold. [Loreto]
Citharexylum poeppigii var. *margaritaceum* Poepp. & Mold. [Amazonas]
Junellia ligustrina (Lag.) Mold. [Arequipa]
Lantana cujabensis var. *parvifolia* Mold. -- delete the asterisk
Lippia alba f. *intermedia* Mold. [Loreto]
Petrea atrocoerulea Mold. [Amazonas]
Verbena litoralis f. *albiflora* (Mold.) Mold. [Amazonas]
Vitex triflora var. *hirsuta* Mold. [San Martín]

BRAZIL:

- Aegiphila lhotzkiana* Cham. [Amazonas]
Amasonia lasiocaulos var. *macrophylla* Mold. [Mato Grosso]
Eriocaulon elichrysoides Bong. [Distrito Federal]
Eriocaulon klotzschii Mold. [Roraima]
Lantana camara f. *flava* (Medic.) Mold. [Bahia]
Lantana fucata Lindl. [Distrito Federal]
Lantana trifolia f. *pluripedunculata* Mold. [Rondônia]
Lippia microcephala Cham. [Bahia]
Paepalanthus cachambuensis Alv. Silv. [São Paulo]
Paepalanthus clausenianus Körn. [Amazônas]
Paepalanthus convexus var. *strigosus* Mold. -- delete the asterisk
Paepalanthus fasciculatus f. *sphaerocephalus* Herzog [Rondônia]
Paepalanthus leucocyaneus f. *egleri* Mold. [Amapá]
Paepalanthus pulchellus var. *puberulentus* Mold. [Goiás]*
Petrea bracteata Steud. [Acre]
Petrea macrostachya Benth. [Mato Grosso]
Petrea martiana Schau. [Amapá]
Petrea martiana var. *glabrescens* Mold. [Amapá]
Philodice cuyabensis (Bong.) Körn. [Amazônas]
Stachytarpheta almasensis Mansf. [Distrito Federal]
Syngonanthus bellus Mold. [Amazônas]
Syngonanthus densifolius var. *venezuelensis* Mold. [Amazônas]
Syngonanthus densus (Körn.) Ruhl. [Bahia]
Syngonanthus egleri var. *pombosensis* Mold. [Amazônas]*
Syngonanthus elegans var. *elanatus* Ruhl. [Amazônas]
Syngonanthus fertilis var. *hirtellus* Mold. [Amazônas]
Syngonanthus gracilis var. *amazonicus* Ruhl. [Pará]
Syngonanthus humboldtii var. *simplex* Mold. [Pará]
Syngonanthus nitens var. *pilosus* Mold. [Amazônas]
Syngonanthus tenuis var. *minor* Mold. [Amazônas]
Syngonanthus xeranthemoides f. *brevifolius* Mold. [Amazônas]
Vitex polygama var. *bakeri* Mold. -- delete the asterisk
Vitex triflora var. *kraatzii* Huber [Rondonia]

BOLIVIA:

- Aloysia beckii* Mold. [Cochabamba]*
Aloysia sellowii (Briq.) Mold. [Chuquisaca]
Lantana canescens H.B.K. [Chuquisaca]
Lippia beckii Mold. [Cochabamba]*
Stachytarpheta canescens H.B.K. [La Paz]
Syngonanthus gracilis var. *bolivianus* Ruhl. [El Beni]
Verbena microphylla H.B.K. [Cochabamba]
Verbena peruviana (L.) Britton [Santa Cruz]
Verbena rigida var. *paraguayensis* Mold. [Santa Cruz]
Vitex cymosa f. *albiflora* Mold. [Santa Cruz]*

PARAGUAY:

- Lippia alba* f. *macrophylla* Mold.
Verbena rigida var. *paraguayensis* Mold. -- delete the asterisk

JUAN FERNANDEZ ISLANDS:

- Verbena brasiliensis* Vell.

ARGENTINA:

Aloysia chacoensis var. *angustifolia* Troncoso [Entre Rios]

Junellia ligustrina (Lag.) Mold. -- delete the asterisk

Lantana tiliaefolia Cham. [Buenos Aires]

ISLE OF WIGHT:

Verbena officinalis L.

EIRE:

Eriocaulon aquaticum (J. Hill) Druce [Clare & Galway Counties]

SPAIN:

Lantana camara f. *splendens* (Medic.) Mold.

ETHIOPIA:

Eriocaulon volkensii Engl.

Eriocaulon zambesiense Ruhl.

LIBERIA:

Clerodendrum dusenii Gürke

NIGERIA:

Duranta repens f. *alba* (Masters) Matuda

Premna quadrifolia var. *warneckeana* Mold.

CAMEROONS:

Eriocaulon bongense Engl. & Ruhl.

ZAIRE:

Eriocaulon afzelianum Wikstr.

BURUNDI:

Lippia grandifolia var. *longipedunculata* Mold.

TANGANYIKA:

Vitex volkensii Gürke -- add an asterisk

KENYA:

Vitex volkensii Gürke -- to be deleted

ZIMBABWE:

Verbena rigida Spreng.

MALAWI:

Clerodendrum milne-redheadi Mold.

Eriocaulon teusczii Engl. & Ruhl.

Lantana camara L.

Vitex doniana var. *parvifolia* (Engl.) Mold.

LESOTHO:

Eriocaulon sonderianum Körn.

SOUTH AFRICA:

Eriocaulon subulatum N. E. Br. [Transvaal]

Vitex zeyheri Sond. [Natal]

PAKISTAN:

Caryopteris grata Benth. -- delete "Poonch"

BHUTAN:

Caryopteris grata Benth.

INDIA:

Clerodendrum longiflorum var. *pubescens* Mold. [Kerala]

Duranta repens f. *serrata* (Mold.) Mold. [Karnataka]

Eriocaulon collinum var. *nanum* Mold. [Tamil Nadu]

SRI LANKA:

Eriocaulon collinum var. *nanum* Mold. -- delete the asterisk

BANGLADESH:

Vitex trifolia var. *subtrisecta* (Kuntze) Mold.

BURMA:

Caryopteris incana (Thunb.) Miq.

Eriocaulon infirmum Steud. [Tenasserim]

CHINA:

Callicarpa bodinieri var. *lyi* (Leveille) Rehd. [Kwangtung]

Callicarpa longipes Dunn -- delete the asterisk

Caryopteris chosenensis Mold. -- not "*C. divaricata* (Sieb. & Zucc.) Maxim."

Duranta repens L. [Yunnan]

Stachytarpheta urticaefolia (Salisb.) Sims [Yunnan]

CHINESE COASTAL ISLANDS:

Verbena officinalis f. *anomala* Mold. [Hainan]*

HONG KONG:

Callicarpa japonica var. *rhombifolia* H. J. Lam

Callicarpa longipes Dunn

Clerodendrum cyrtophyllum f. *dentatum* Mold.*

Clerodendrum philippinum Schau.

Clerodendrum splendens G. Don

Vitex parviflora A. L. Juss.

THAILAND:

Clerodendrum hastato-oblongum C. B. Clarke*

Congea griffithiana var. *elliptica* Munir

Eriocaulon nilagirens Steud.

MALAYAN ISLANDS:

Premna obtusifolia R. Br. [North Sister]

KOREA:

Caryopteris chosenensis Mold. -- not "*C. divaricata* (Sieb. & Zucc.) Maxim."

KOREAN COASTAL ISLANDS:

Vitex turczaninowii Merr. [Botel Tobago]

JAPAN:

Caryopteris chosenensis Mold. -- not "*C. divaricata* (Sieb. & Zucc.) Maxim."

RYUKYU ISLANDS ARCHIPELAGO:

Callicarpa japonica var. *luxurians* Rehd. [Tokunoshima]

Callicarpa oshimensis Hayata [Tokunoshima]

Clerodendrum trichotomum var. *fargesii* (Dode) Rehd. [Tokunoshima]

PHILIPPINE ISLANDS:

Callicarpa longifolia f. *floccosa* Schau. [Mindoro]

Clerodendrum intermedium Cham. [Camiguin]

Vitex quinata (Lour.) F. N. Will. -- to be deleted

Vitex quinata var. *puberula* (H. J. Lam) Mold. -- to be deleted

Vitex trifolia L. [Batan]

Vitex turczaninowii Merr. [Batan, Leyte, Luzon, Mindanao, Mindoro, Palawan, Samar, & Ticao]

Vitex turczaninowii f. *puberula* (H. J. Lam) Mold. [Leyte, Luzon, Masbate, Mindanao, & Palawan]

PALAU ISLANDS:

Vitex trifolia var. *bicolor* (Willd.) Mold. [Kayangel]

GREATER SUNDA ISLANDS:

Eriocaulon australe R. Br. [Sabah]

Eriocaulon leucogenes Ridl. [Sumatra]
Eriocaulon truncatum Hamilt. [Brunei]
Vitex turczaninowii f. *puberula* (H. J. Lam) Mold. [Sarawak]

MOLUCCA ISLANDS:

Avicennia alba var. *latifolia* Mold. [Ceram]
Vitex quinata (Lour.) F. N. Will. -- to be deleted
Vitex quinata var. *puberula* (H. J. Lam) Mold. -- to be deleted
Vitex turczaninowii Merr. [Amboina & Halmahera]
Vitex turczaninowii f. *puberula* (H. J. Lam) Mold. [Batjan,
Buru, Halmahera, Morota, Obi, & Soelabesi]

AROE ISLANDS:

Vitex quinata var. *puberula* (H. J. Lam) Mold. -- to be deleted
Vitex turczaninowii f. *puberula* (H. J. Lam) Mold. [Oedjir]

CAROLINE ISLANDS:

Clerodendrum inerme (L.) Gaertn. [Uoala]

BISMARK ARCHIPELAGO:

Vitex trifolia var. *bicolor* (Willd.) Mold. [Manus]

NEW HEBRIDES:

Faradaya lehuntei (Horne) A. C. Sm. [Aneityum]
Faradaya neo-ebudica Guillaum. -- to be deleted

NEW CALEDONIAN ISLANDS:

Lantana camara f. *alba* (Mold.) Mold. [New Caledonia]
Premna guillauminii Mold. [Ducos]

FIJI ISLANDS:

Clerodendrum gordonii Horne -- to be deleted
Faradaya lehuntei (Horne) A. C. Sm. [Kandavu, Matuku, Moala,
Ngau, Ovalau, Tailevu, Taveuni, Vanua Levu, & Viti Levu]
Faradaya lehuntei var. *degeneri* (Mold.) Mold. [Viti Levu]*
Faradaya neo-ebudica Guillaum. -- to be deleted
Faradaya neo-ebudica var. *degeneri* (Mold.) Mold. -- to be de-
leted
Faradaya neo-ebudica var. *puberulenta* (Mold.) Mold. -- to be
deleted
Faradaya ovalifolia (A. Gray) Seem. [Matuku]
Faradaya vitiensis Seem. [not "(A. Gray) Seem."]
Vitex turczaninowii Merr. [Viti Levu]

TONGAN ISLANDS:

Faradaya amicorum (Seem.) Seem. [Vavau]
Faradaya lehuntei (Horne) A. C. Sm. [Eua]
Faradaya neo-ebudica Guillaum. -- to be deleted

AUSTRALIA:

Lantana camara var. *aculeata* (L.) Mold. [Tasmania]
Lantana camara f. *mista* (L.) Mold. [South Australia]
Lantana camara var. *moritziana* (Otto & Dietr.) López-Palacios
[Queensland]
Pityrodia terminalis (Endl.) George [South Australia]

GREAT BARRIER REEF:

Faradaya splendida F. Muell. [Dunk]

CULTIVATED:

Aloysia triphylla (L'Hér.) Britton [Alabama, District of Colum-
bia, Maryland, & Texas]
Aloysia triphylla f. *serrulata* Mold. [Indiana & New York]*

- Callicarpa dichotoma* (Lour.) K. Koch [Michigan]
Callicarpa formosana Rolfe [California]
Callicarpa japonica f. *albibacca* Hara [England]
Caryopteris chosenensis Mold. -- not "*C. divaricata* (Sieb. & Zucc.) Maxim."
Caryopteris glutinosa Rehd. [England & Massachusetts]
Caryopteris incana (Thunb.) Miq. [France & Indiana]
Caryopteris mongholica var. *serrata* Maxim. [Pennsylvania]
Citharexylum donnell-smithii Greenm. [Costa Rica]
Citharexylum spinosum L. [French Guiana]
Clerodendrum philippinum f. *multiplex* (Sweet) Mold. [Hong Kong]
Clerodendrum splendens G. Don [Dominican Republic]
Clerodendrum ugandense Prain [Kenya]
Clerodendrum umbellatum Poir. [Hong Kong]
Congea tomentosa Roxb. [Zimbabwe]
Congea velutina Wight [New Caledonia]
Duranta repens L. [Australia]
Duranta repens f. *alba* (Masters) Matuda [Australia & South Africa]
Duranta repens f. *integrifolia* (Tod.) Mold. [Panama & South Africa]
Duranta repens var. *lopez-palacii* Mold. [California]
Duranta repens f. *serrata* (Mold.) Mold. [Mexico]
Duranta repens f. *variegata* (L. H. Bailey) Mold. [Australia]
Faradaya lehuntei (Horne) A. C. Sm. [Java]
Faradaya neo-ebudica Guillaum. -- to be deleted
Faradaya papuana Scheff. [England]
Faradaya splendida F. Muell. [England]
Gmelina arborea var. *canescens* Haines [Cuba]
Gmelina philippensis Cham. [Pennsylvania]
Hemiphora elderi F. Muell. [Australia]
Holmskioldia tettensis (Klotzsch) Vatke [Pennsylvania]
Lantana camara f. *flava* (Medic.) Mold. [California, District of Columbia, Ecuador, Florida, Pennsylvania, & Zimbabwe]
Lantana camara var. *moritziana* (Otto & Dietr.) López-Palacios [Cuba & Zimbabwe]
Lantana camara f. *nana* (Mold.) Mold. [California & District of Columbia]
Lantana camara f. *rubello-flavescens* Mold. [Ecuador]*
Lantana camara f. *splendens* (Medic.) Mold. [California, Costa Rica, & District of Columbia]
Lantana glandulosissima Hayek [Zimbabwe]
Lantana hispida H.B.K. [Alabama]
Lantana montevidensis (Spreng.) Briq. [District of Columbia]
Lippia alba (Mill.) N. E. Br. [Dominican Republic]
Lippia alba f. *intermedia* Mold. [Haiti & Tortue]
Lippia alba f. *macrophylla* Mold. [Haiti]
Lippia graveolens H.B.K. [Delaware, New Jersey, & New York]
Newcastelia insignis E. Pritz. [Australia]
Petrea bracteata Steud. [Honduras]
Petrea volubilis L. [Singapore]

Phyla scaberrima (A. L. Juss.) Mold. [El Salvador]
Premna microphylla Turcz. [Pennsylvania]
Stachytarpheta frantzii Polak. -- delete "Zimbabwe"
Stachytarpheta frantzii var. *mollissima* Mold. [Zimbabwe]
Stachytarpheta mutabilis (Jacq.) Vahl [Florida]
Syngonanthus niveus (Bong.) Ruhl. [New Jersey]
Tectona grandis f. *canescens* Mold. [Brazil]
Verbena Xhybrida Voss [Indiana & New Hampshire]
Verbena monacensis Mold. [Mexico]
Vitex agnus-castus L. [Bahama Islands, Dominican Republic, & Ohio]
Vitex agnus-castus f. *caerulea* (Rehd.) Mold. [Puerto Rico]
Vitex agnus-castus f. *rosea* Rehd. [California]
Vitex negundo L. [Zimbabwe]
Vitex negundo var. *cannabifolia* (Sieb. & Zucc.) Hand.-Mazz. [California & Russia]
Vitex orinocensis var. *multiflora* (Miq.) Huber [Venezuela]
Vitex trifolia var. *simplicifolia* Cham. [Zimbabwe]

II. Rejected names, misspellings, and mis-accreditations:

Acantholippia punensis Botta = *A. deserticola* (R. A. Phil.) Mold.
Aegiphila chrysantha Mayek. = *A. chrysantha* Hayek
Aegophylla Steud. = *Aegiphila* Jacq.
Aegophylla deppeana Steud. = *Aegiphila deppeana* Steud.
Aegophylla monstrosa Mold. = *Aegiphila monstrosa* Mold.
Avicennia nitens Jacq. = *A. germinans* (L.) L.
Callicarpa R. & P. = *Aegiphila* Jacq.
Callicarpa bodinieri var. *giraldii* (Hesse ex Rehd.) Rehd. = *C. bodinieri* var. *giraldii* (Hesse) Rehd.
Caryopteris Farington = *Caryopteris* Bunge
Caryopteris incana Farington = *Caryopteris incana* (Thunb.) Miq.
Caryopsis Bunge = *Caryopteris* Bunge
Caryopteris divaricata Maxim. = *C. chosenensis* Mold.
Caryopteris divaricata (Sieb. & Zucc.) Maxim. = *C. chosenensis* Mold.
Caryopteris foetida (D. Don) Thib. = *C. grata* Benth.
Caryopteris grata (Wall.) Benth. = *C. grata* Benth.
Citharexylum berlandieri B. L. Robinson = *Citharexylum berlandieri* B. L. Robinson
Citharexylum flabellifolium S. Wats. = *Citharexylum flabellifolium* S. Wats.
Citharexylum Greenm. = *Citharexylum* B. Juss.
Citharexylum glabrum (S. Wats.) Greenm. = *Citharexylum glabrum* (S. Wats.) Greenm.
Citharexylum cinereum Hort. = *C. pentandrum* Vent.
Citharexylum gentryi Lundell = *C. gentryi* Mold.
Citharexylum glabrum (Swart.) Greenm. = *C. glabrum* (S. Wats.) Greenm.
Citharexylum glabrum (Swats) Greenm. = *C. glabrum* (S. Wats.) Greenm.
Clerodendron divaricatum Sieb. & Zucc. = *Caryopteris chosenensis* Mold.

- Clerodendron hastato-oblongum* C. B. Clarke = *Clerodendrum hastato-oblongum* C. B. Clarke
- Clerodendron innerme* Seem. = *Clerodendrum innerme* (L.) Gaertn.
- Clerodendron lehuntei* Horne = *Faradaya lehuntei* (Horne) A. C. Sm.
- Clerodendron lehuntei* Horne = *Faradaya lehuntei* (Horne) A. C. Sm.
- Clerodendrum hastato-oblongum* C. B. Clarke -- to be deleted
- Clerodendrum lehuntei* Horne = *Faradaya lehuntei* (Horne) A. C. Sm.
- Clerodendron* A. Gray = *Clerodendrum* Burm.
- Clerodendron ovalifolia* Gray = *Faradaya ovalifolia* (A. Gray) Seem.
- Conglea Layzell* & Horton = *Congea* Roxb.
- Conglea villosa* Roxb. = *Congea griffithiana* Munir
- Duranta repes* L. = *D. repens* L.
- Eleocharis chrysanthemifolium* Schnitzl. = *Syngonanthus anthemiflorus* (Bong.) Ruhl.
- Eriocaulon engleri* Ruhl. = *E. ravenelii* Chapm.
- Eriocaulon johnstouii* Ruhl. = *E. johnstonii* Ruhl.
- Eriocaulon mantoense* Hayata = *E. nantoense* Hayata
- Eriocaulon microcephalum* H.B.K. = *E. microcephalum* H.B.K.
- Faradaija Wigman* = *Faradaya* F. Muell.
- Faradaija papuana* Wigman = *Faradaya papuana* Scheff.
- Faradaija splendida* Wigman = *Faradaya splendida* F. Muell.
- Faradaija prob. ternifolia* F. v. Müll. = *Faradaya dimorpha* Pulle
- Faradaya amicorum* var. *salomonensis* Bakh. = *F. salomonensis* (Bakh.) Mold.
- Faradaya neo-ebudica* Guillaum. = *F. lehuntei* (Horne) A. C. Sm.
- Faradaya neo-ebudica* var. *degeneri* Mold. = *F. lehuntei* var. *degeneri* (Mold.) Mold.
- Faradaya neo-ebudica* var. *puberulenta* Mold. = *F. lehuntei* (Horne) A. C. Sm.
- Faradaya neo-ebudica* var. *puberulenta* (Mold.) Mold. = *F. lehuntei* (Horne) A. C. Sm.
- Faradaya vitiensis* var. *puberulenta* Mold. = *F. lehuntei* (Horne) A. C. Sm.
- Glossocarya hemiderma* (F.V.M.) Benth. = *G. hemiderma* (F. Muell.) Benth.
- Lachnostachys eriobotrya* (F. & M.) Druce = *L. eriobotrya* (F. Muell.) Druce
- Lantana lilacina* R. Brown = *L. camara* var. *moritziana* (Otto & Dietr.) López-Palacios
- Lantana strigosa* Greenm. = *L. achyranthifolia* Desf.
- Leiothrix tinguensis* Herzog = *L. tinguensis* Herzog
- Lippia pycnocephala* H.R. = *L. myriocephala* var. *hypoleia* (Briq.) Mold.
- Lippia reptans* (Sprague) H.B.K. = *Phylla strigulosa* (Mart. & Gal.) Mold.
- Lomatia* Sol. = *Premna* L.
- Microtaena ? coreana* Léveillé = *Caryopteris chosenensis* Mold.
- Paepalanthus bargulatus* Herzog = *P. barbulatus* Herzog
- Paepalanthus dentroides* (H.B.K.) Kunth = *P. pilosus* (H.B.K.) Kunth
- Phylla domingensis* Molh. = *Lippia domingensis* Mold.
- Phylla stoechadifolia* Mold. = *Phylla stoechadifolia* (L.) Small

- Sijymphorema* Lam & Bakh. = *Symphorema* Roxb.
Symbolanthus Humbert = *Syngonanthus* Ruhl.
Tectona hamiltonii Wall. = *T. hamiltoniana* Wall.
Terminalioides Soland. = *Faradaya* F. Muell. & *F. amicorum* (Seem.) Seem.
Tonina aquatilis Aubl. = *T. fluviatilis* Aubl.
Verbena ambrosoides Rydb. = *V. ambrosifolia* Rydb.
Verbena melendris Paxt. = *V. peruviana* (L.) Britton
Verbena rigida var. *grandulifera* Mold. = *V. rigida* var. *glandulifera* Mold.
Vitex agnus-castus f. *albiflora* Mold. = *V. agnus-castus* f. *alba* (West.) Rehd.
Vitex cannabina Beal = *V. negundo* var. *cannabifolia* (Sieb. & Zucc.) Hand.-Mazz.
Vitex intermedia Carrick & Enoch = *V. trifolia* var. *bicolor* (Willd.) Mold.
Vitex lukundjensis Pieper = *V. lokundjensis* Pieper
Vitex lukundjensis var. *kruckei* Pieper = *V. lokundjensis* var. *kruckei* Pieper
Vitex negundo L. var. *Cham.* = *V. trifolia* var. *bicolor* (Willd.) Mold.
Vitex negundo var. *bicolor* H. J. Lam = *V. trifolia* var. *bicolor* (Willd.) Mold.
Vitex negundo var. *bicolor* (Lam.) Mold. = *V. trifolia* var. *bicolor* (Willd.) Mold.
Vitex negundo var. *bicolor* (Lam.) Willd. = *V. trifolia* var. *bicolor* (Willd.) Mold.
Vitex negundo bicolor (Willd.) H. J. Lam = *V. trifolia* var. *bicolor* (Willd.) Mold.
Vitex orinocensis var. *multifolia* (Miq.) Huber = *V. orinocensis* var. *multiflora* (Miq.) Huber
Vitex trichanthera J. G. Baker = *V. trichantha* J. G. Baker
Vitex triflora odorata, sylvestris J. Burm. = *V. leucoxydon* L.f.
Vitex trifoliata var. *bicolor* (Willd.) Whistler = *V. trifolia* var. *bicolor* (Willd.) Mold.
Vitex 6-dentata Wall. = *Caryopteris grata* Benth.

NOTES ON NEW AND NOTEWORTHY PLANTS. CLX

Harold N. Moldenke

LANTANA CAMARA var. *MORITZIANA* f. *ACULEIFERA* Mold., f. nov.

Haec forma a forma typica varietatis ramulis plusminusve perspicue aculeatis recedit.

This form differs from the typical form of the variety in its branches and branchlets being more or less conspicuously aculeate.

The form is based on *José Cuatrecasas* 1920 from the vicinity of Boavita, at 2250 m. altitude, Boyaca, Colombia, collected on September 16, 1938, and deposited in the United States National Herbarium in Washington.

LANTANA FRUTILLA f. *GROSSIDENTATA* Mold., f. nov.

Haec forma a forma typica speciei laminis foliorum maturis late ovatis ad 4 cm. latis marginaliter valde grossidentatis dentibus late ovatis apicaliter rotundatis recedit.

This form differs from the typical form of the species in having its mature leaf-blades thinly membranous in texture, broadly ovate in shape, to 4 cm. wide, the margins from the widest part to the apex very coarsely dentate with few, very conspicuous, ovate, slightly antrorse, apically rounded teeth.

The type of the form was collected by John D. Dwyer (no. 14304) near a crest called Terpene about 5 miles south of Matamoros, Puebla, Mexico, on July 2, 1977, and is deposited in the Lundell Herbarium at the University of Texas in Austin. The collector describes the plant as a shrub to 8 feet tall, the corollas white.

LANTANA HISPIDA f. *PARVIFOLIA* Mold., f. nov.

Haec forma a forma typica speciei laminis foliorum maturis parvioribus 2.5--4 cm. longis 1.5--2.5 cm. latis recedit.

This form differs from the typical form of the species in its uniformly smaller mature leaves during anthesis and/or fruit, the blades being only 2.5--4 cm. long and 1.5--2.5 cm. wide in most cases.

The form is based on *Efraín Romero* 71 from the vicinity of Ciudad Universitaria, Morazán, Honduras, collected on May 26, 1978, and deposited in the herbarium of the Missouri Botanical Garden at St. Louis.

LANTANA HORRIDA f. *INERMIS* Mold., f. nov.

Haec forma a forma typica speciei caulibus ramisque ramulisque uniforme inermis recedit.

This form differs from the typical form of the species in having its stems, branches, and branchlets uniformly unarmed.

The form is based on *G. F. Gaumer* 808 from Yucatán, Mexico, deposited in the United States National Herbarium in Washington.

LIPPIA GRAVEOLENS f. *LOESENERIANA* Mold., f. nov.

Haec forma a forma typica speciei laminis foliorum subtus densissime molliterque albido-tomentosis recedit.

This form differs from the typical form of the species in having the lower surface of its leaf-blades very densely, conspicuously, and softly white-tomentose.

The form is based on *Seler & Seler* 3043 from dry sunny cliffs at Gracias á Dios, Chiapas, Mexico, collected on August 19, 1896,

and deposited in the United States National Herbarium in Washington. Loesener was the first to call attention to the distinctness of this form.

STACHYTARPHETA BELIZENSIS Mold., sp. nov.

Frutex ramis lignosis griseis subglabratibus; ramulis erectis gracilibus firmis subteretibus dense puberulis; foliis breviter petiolatis, laminis chartaceis elliptico-lanceolatis apicaliter argute acutis marginaliter grosse serratis basaliter acuminatis in petiolum cuneato-decurrentibus utrinque parcissime irregulariterque pilosulis; inflorescentiis terminalibus spicatis elongatis densissime multifloris ubique adpresso-pilosis; bracteis valde lanceolato-ovatis perspicuis 10--15 mm. longis basaliter 2--3 mm. latis apicaliter longe aristato-acuminatis.

A shrub to 1 m. tall; stems and branches apparently quite woody, gray, subglabrate; branchlets more slender, subterete, brownish, firmly erect, densely puberulent; leaves decussate-opposite, usually with a few very small ones on much abbreviated twigs in their axils, rather uniformly green or slightly lighter beneath, short-petiolate, the blades chartaceous. elliptic-ovate, 3--5 cm. long, 1--2 cm. wide, apically very sharply acute, marginally coarsely serrate to slightly below the widest part, basally long-acuminate and cuneately narrowed into the petiole, very sparsely and irregularly whitish-pilosulous on both surfaces; inflorescence terminal, spicate, pedunculate, 15--25 cm. long, about 1 cm. wide, rather sparsely whitish-pilosulous with appressed or subappressed hairs throughout, densely many-flowered, stiffly erect; peduncles 3--4 cm. long; bracts conspicuous, ascending-spreading, plainly lanceolate-ovate, 10--15 mm. long, basally 2--3 mm. wide, apically long-acuminate, aristate, or even subcaudate; corolla maroon.

The type of this species was collected by John D. Dwyer (NO. 14974) between mile 16 and 19 on the Northern Highway, Belize District, Belize, on July 22, 1980, and is deposited in the Lundell Herbarium at the University of Texas in Austin.

SYNGONANTHUS EGLERI var. *POMBOSENSIS* Mold., var. nov.

Haec varietas a forma typica speciei foliis basalibus et foliis involucrantibus simillimis lato-oblongis 6--12 cm. longis 1--1.5 cm. latis apicaliter rotundatis vel rotundato-subacutis recedit.

This variety differs from the typical form of the species in having its basal and involucral leaves very similar in size, shape, and texture, uniformly broadly oblong, 6--12 cm. long, 1--1.5 cm. wide, apically rounded or rounded-subacute.

Type: *Calderón, Monteiro, & Guedes 2608* from the rocky edge of the Rio dos Pombos, a tributary of the Rio Yuma, above the waterfall about 3 km. upstream from the intersection with the Transamazon Highway and 73 km. east of the Rio Aripuaña, Amazônia, Brazil, collected on June 20, 1979, deposited in the Lundell Herbarium at the University of Texas in Austin. The collectors note that the plant was abundant in very wet areas between mosses and another ericaceous species.

ADDITIONAL NOTES ON THE GENUS VITEX. XXXVI

Harold N. Moldenke

VITEX Tourn.

Additional & emended bibliography: Willd. in L., Sp. Pl., ed. 4, 3 (2): 6 & 390--393. 1802; Blume, Flora 8: 107--109. 1825; Miq., Journ. Bot. Neerl. 1: 115. 1861; Powell in Seem., Journ. Bot. 6: 359. 1868; Horne, Year Fiji 269 & 275. 1881; Drake del Castillo, Illustr. Fl. Ins. Mar. Pacif. 260. 1892; Shirasawa, Bull. Coll. Agric. Tokyo 2: 270, pl. 18, fig. 17. 1895; C. K. Schneid., Dendrol. Winterstud. 188, 198, 201, & 267, fig. 191 a--g. 1903; F. W. Harvey, Garden 76: 24. 1912; Bakh. in White, Journ. Arnold Arb. 10: 264. 1929; W. Trelease, Wint. Bot., ed. 3, imp. 1, 323, 325, 334, & 335. 1931; Masamune, Trans. Nat. Hist. Soc. Formos. 22: 169, 220, & 224. 1932; Hosokawa, Trans. Nat. Hist. Soc. Formos. 23: 233. 1933; Masamune, Mem. Fac. Sci. Agr. Taihoku Univ. 11, Bot. 4: 388. 1934; Takenouchi, Journ. Nat. Hist. Fukuoka 2: 15. 1936; Hunt, South. Gard. 94. 1982; Mold., Phytologia 51: 388, 496, & 510 (1982) and 52: 19. 1982.

The Masamune (1932) reference in the bibliography (above) is sometimes cited as "121: 169, 220, & 224", but "121" is the issue number, not the volume number. This author classifies *Vitex* in what he calls the "Vitaceae". The index in the Hunt reference (1982, above) indicates that *Vitex* is mentioned on pages 91 & 93 of that work, but we fail to find it there.

VITEX AGNUS-CASTUS L.

Additional & emended bibliography: Willd. in L., Sp. Pl., ed. 4, 3 (2): 391. 1802; C. K. Schneid., Dendrol. Winterstud. 188 & 198, fig. 191 a--g. 1903; Brandis, Indian Trees, imp. 3, 504. 1911; F. W. Harvey, Garden 76: 24. 1912; Brandis, Indian Trees, imp. 5, 504. 1971; Mold., Phytologia 51: 246--290 & 330--355. 1982.

Additional citations: ISRAEL: J. Grant 143 (N).

VITEX AGNUS-CASTUS f. ALBA (West.) Rehd.

Additional synonymy: *Vitex agnus-castus* f. *albiflora* Mold., in herb.

Additional bibliography: Mold., Phytologia 51: 214. 1982.

VITEX AGNUS-CASTUS f. LATIFOLIA (Mill.) Rehd.

Additional bibliography: Willd. in L., Sp. Pl., ed. 4, 3 (2): 391. 1802; Mold., Phytologia 51: 214. 1982.

VITEX ALTISSIMA L. f.

Additional bibliography: Willd. in L., Sp. Pl., ed. 4, 3 (2): 391. 1802; Mold., Phytologia 51: 215 & 344. 1982.

VITEX ALTISSIMA f. *juv. ALATA* (Willd.) Mold.

Additional & emended bibliography: Brandis, Indian Trees, imp. 3, 504 (1911) and imp. 5, 504. 1971; Mold., Phytologia 51: 215. 1982.

VITEX CANESCENS Kurz

Additional & emended bibliography: Brandis, Indian Trees, imp. 3, 504 (1911) and imp. 5, 504. 1971; Mold., Phytologia 51: 217--218. 1982.

VITEX CAPITATA Vahl

Additional bibliography: Willd. in L., Sp. Pl., ed. 4, 3 (2): 393. 1802; Mold., Phytologia 51: 213. 1982.

VITEX COOPERI Standl.

Additional bibliography: Mold., Phytologia 48: 455. 1981.

Liesner and his associates refer to this plant as a tree, 8 m. tall, with bluish-purple corollas, and found it in anthesis in July at 500 m. altitude.

Additional citations: COSTA RICA: Alajuela: Liesner, Almeda, & Wilbur 3469 (E--2903445).

VITEX CYMOSA Bert.

Additional bibliography: Mold., Phytologia 51: 248--250 (1982) and 52: 19. 1982.

Recent collectors describe this plant as a tree, 15 m. tall, with a trunk to 25 cm. in diameter at breast height, and have found it growing in wet subtropical forests, at 226--650 m. altitude, in flower in October. The corollas on Beck 7135 are said to have been "blue" when fresh.

Additional citations: BOLIVIA: El Beni: Meneces & Terceros 377 (Ld). Santa Cruz: S. G. Beck 7135 (Ld).

VITEX CYMOSA f. *ALBIFLORA* Mold., Phytologia 52: 19. 1982.

Bibliography: Mold., Phytologia 52: 19. 1982.

Citations: BOLIVIA: Santa Cruz: S. G. Beck 7136 (Ld--type).

VITEX DIVARICATA Sw.

Additional bibliography: Willd. in L., Sp. Pl., ed. 4, 3 (2): 390. 1802; Brandis, Indian Trees, imp. 1, 504 (1906), imp. 3, 504 (1911), and imp. 5, 504. 1971; Mold., Phytologia 51: 250 & 257. 1982.

VITEX DONIANA Sweet

Additional bibliography: Mold., Phytologia 51: 251. 1982.

Additional citations: ZAIRE: Donis 3456 (N).

VITEX DONIANA var. *PARVIFOLIA* (Engl.) Mold.

Additional bibliography: Mold., Phytologia 51: 251. 1982.

Reekmans refers to this plant as a tree, 6 m. tall, and found it in (green) fruit in March.

Additional citations: BURUNDI: Reekmans 5829 (N).

VITEX FLORIDULA Duchass. & Walp.

Additional bibliography: Mold., *Phytologia* 51: 251. 1982.

Correa & Dressler describe this plant as a tree, 30 feet tall, with "blue-violet" corollas, and found it in full anthesis in March.

Additional citations: PANAMA: Panamá: Correa & Dressler 829 (N).

VITEX GAMOSEPALA W. Griff.

Additional bibliography: Mold., *Phytologia* 51: 253, 260, & 276. 1982.

Geesink and his associates refer to this plant as a tree, 5 m. tall, with both "yellow" corollas and black fruit in June, and found it growing in evergreen forests on sandstone hills, at 50 m. altitude.

Additional citations: THAILAND: Geesink, Hattink, & Charoenphol 7390 (Ac).

VITEX GAUMERI Greenm.

Additional bibliography: Mold., *Phytologia* 51: 254. 1982.

Nelson and his associates refer to this species as a tree, 20 m. tall, and found it in fruit in June, recording for it the vernacular name, "barrabás".

Additional citations: HONDURAS: Comayagua: Nelson, Vargas, Alduin, & Pereira 3607 (Ld).

VITEX GLABRATA R. Br.

Additional & emended bibliography: Brandis, *Indian Trees*, imp. 3, 505 (1911) and imp. 5, 505. 1971; Mold., *Phytologia* 51: 254--255 & 267. 1982.

The Fox collection, cited below, was originally distributed as *A. parviflora* A. L. Juss. and later cited by me, erroneously, as *V. quinata* var. *puberula* (H. J. Lam) Mold.

The Yates 1609, distributed as *V. glabrata*, actually is *V. turczaninowii* f. *puberula* (H. J. Lam) Mold.

Additional & emended citations: THAILAND: Congdon 591 (Ac). PHILIPPINE ISLANDS: Luzon: Fox 99 [Philip. Nat. Herb. 4706] (Mi).

VITEX GRANDIFOLIA Gürke

Additional bibliography: Mold., *Phytologia* 48: 458 (1981) and 49: 464. 1981.

Additional citations: LIBERIA: Blickenstaff 18 (Mi); Daniel 331 (Mi). NIGERIA: J. G. Smith 431 (Mi).

VITEX GRISEA var. *DEKINDTIANA* (Gürke) Pieper

Additional bibliography: Mold., *Phytologia* 45: 488. 1980; Mold., *Phytol. Mem.* 2: 234 & 590. 1980.

VITEX GUERKEANA var. *GOSSWEILERI* Pieper

Additional bibliography: Mold., *Phytologia* 45: 488. 1980; Mold., *Phytol. Mem.* 2: 234 & 590. 1980.

VITEX GUIANENSIS Mold.

Additional bibliography: Mold., *Phytologia* 45: 488. 1980; Mold., *Phytol. Mem.* 2: 123 & 590. 1980.

VITEX HEPTAPHYLLA A. L. Juss.

Additional bibliography: Mold., *Phytologia* 51: 250 & 256--257. 1982.

The Liogiers refer to this plant as a tree, 8--10 m. tall, with spreading branches, "blue" corollas, and yellow fruit, and encountered it in flower and fruit in May, growing on lateritic soil.

Additional citations: HTSPANIOLA: Dominican Republic: *Liogier & Liogier* 26676 (N).

VITEX KUYLENII Standl.

Additional bibliography: Mold., *Phytologia* 51: 258 & 264. 1982.

Dwyer refers to this species as a tree, 6 m. tall, and found it with purple-black fruit in July.

Additional citations: BELIZE: *Dwyer* 14843 (Ld).

VITEX LEANDRII Mold.

Additional bibliography: Mold., *Phytologia* 46: 12. 1980; Mold., *Phytol. Mem.* 2: 252 & 591. 1980.

VITEX LEBRUNI Mold.

Additional bibliography: Mold., *Phytologia* 46: 12. 1980; Mold., *Phytol. Mem.* 2: 221 & 591. 1980.

VITEX LEHMBACHII Glürke

Additional bibliography: Mold., *Phytologia* 46: 12 & 21. 1980; Mold., *Phytol. Mem.* 2: 215 & 591. 1980.

VITEX LEUCOXYLON L. f.

Additional & emended bibliography: Willd. in L., *Sp. Pl.*, ed. 4, 3 (2): 392. 1802; Brandis, *Indian Trees*, imp. 3, 504 (1911) and imp. 5, 504. 1971; Mold., *Phytologia* 51: 259, 339, & 347. 1982.

The *Wirawan*, *Cooray*, & *Balakrishnan* 914a sheet in the University of Michigan herbarium, a number cited by me from other herbaria as typical *V. leucoxyton*, seems definitely to represent *f. zeylanica* (Mold.) Mold. On the other hand, the leaflets on the Michigan sheet of *Saldanha* 13175 are definitely too large for *f. zeylanica*.

Additional & emended citations: INDIA: Karnataka: *Ramamoorthy & Gandhi* H.F.P. 2764 (Mi); *Saldanha* 13009 (Mi), 13175 (Mi), 16745 (Mi).

VITEX LEUCOXYLON f. *ZEYLANICA* (Mold.) Mold.

Additional bibliography: Mold., *Phytologia* 51: 259. 1982.

The *Saldanha* 13175 specimen in the University of Michigan herbarium seems to be typical *V. leucoxyton* L. f., rather than the present form.

Additional & emended citations: SRI LANKA: *Fosberg, Mueller-Dombois, Wirawan, Cooray, & Balakrishnan* 51081 (Mi); *Wirawan, Cooray,*

& Balakrishnan 914 (Mi), 914a in part (Mi).

VITEX LIMONIFOLIA Wall.

Additional & emended bibliography: Brandis, Indian Trees, imp. 3, 504 (1911) and imp. 5, 504. 1971; Mold., Phytologia 51: 259. 1982.

VITEX LOKUNDJENSIS Pieper

Synonymy: *Vitex lukundjensis* Pieper ex Mold., Phytologia 51: 260, sphalm. 1982.

Additional bibliography: Mold., Phytologia 51: 260. 1982.

VITEX LOKUNDJENSIS var. *KRUCKEI* Pieper

Additional synonymy: *Vitex lukundjensis* var. *kruckei* Pieper ex Mold., Phytologia 51: 260, sphalm. 1982.

Additional bibliography: Mold., Phytologia 51: 260. 1982.

VITEX LUCENS T. Kirk

Additional & emended bibliography: Hook., Icon. Pl. 5: pl. 419/420. 1842; Stafleu & Cowan, Taxon. Lit., ed. 2, 294--295. 1979; Mold., Phytologia 51: 260--261. 1982.

Emended illustrations: Hook., Icon. Pl. 5: pl. 419/420. 1842.

The Hooker (1842) plate is sometimes erroneously cited as "1519/1620" and dated "1844".

Orchard found this tree in full fruit in October.

Additional citations: NEW ZEALAND: North: Cooper & Nickerson 6230 (W--2947672); MacDaniels P.563 (It); Orchard 3540 (Ba--370074). MOUNTED ILLUSTRATIONS: Hook., Icon. Pl. 5: pl. 419/420 (Ba--380420).

VITEX NEGUNDO L.

Additional & emended bibliography: Fcur., Fl. Cochinch., ed. 1, 2: 390--392. 1790; Will. in L., Sp. Pl., ed. 4, 3 (2): 393. 1802; Miq., Journ. Bot. Néerl. 1: 115. 1861; Shirasawa, Bull. Coll. Agric. Tokyo 2: 270, pl. 10, fig. 17. 1895; Brandis, Indian Trees, imp. 3, 503--504. 1911; Bakh. in White, Journ. Arnold Arb. 10: 264. 1929; Hosokawa, Trans. Nat. Hist. Soc. Formos. 23: 233. 1933; Brandis, Indian Trees, imp. 5, 503--504. 1971; Everett, N. Y. Bot. Gard. Illust. Encycl. Hort. 10: 3514 & 3515. 1982; Mold., Phytologia 51: 247, 264--266, 276, 331, 337, 339, 343--345, 347, & 349--351. 1982.

Additional & emended illustrations: Shirasawa, Bull. Coll. Agric. Tokyo 2: pl. 10, fig. 17. 1895; Everett, N. Y. Bot. Gard. Illust. Encycl. Hort. 10: 3514. 1982.

Shirasawa (1895) describes the winter characteristics of this plant as "Knospen sind unter der Blattachsel verborgen, so dass man die Zahl der Blättchen nicht wahrnehmen kann, graubraun filzig behaart. Die einjährigen Zweige viereckig, graubraun, erade u. lang. Blattnarbe sichelförmig. Lent. klein, deutlich. Mark 4 kantig." He records the vernacular Japanese name, "ninjinboku".

The corollas are said to have been "blue" on *Lei* 700, "bluish" on *Taam* 1728, "violet" on *Keng* 1632, "purple" on *Chan* 1084 and

Wang 32749, "white with purple spots inside" on Chan 1074, "purplish-white with deep purple" on Chun & Tso 43701, and "blue, white" on Gressitt 461.

Everett (1982) says that "Most vitexes thrive in a wide variety of soils so long as they are not excessively wet....All like warm, sunny locations. Although no regular pruning is necessary, some vitexes, including the chaste tree and *V. negundo* and their varieties, can be kept fairly low by severe pruning each spring just before new growth begins. The treatment consists of cutting back last year's branches to within an inch or two of their bases and completely eliminating enough of these to preclude overcrowding of the new shoots. Vitexes have long, stringy roots and therefore do not transplant readily. When they are moved it is important to retain as many roots as possible and to cut the tops back severely. In the north, spring is the best time to transplant. Propagation is easy by summer cuttings under mist or in a greenhouse or cold frame propagating bed, by layering, and by seed. The seed may be sown indoors in winter or in a cold frame in spring."

The Wan & Chow 79016, distributed as typical *V. negundo*, actually is var. *cannabifolia* (Sieb. & Zucc.) Hand.-Mazz.

Additional citations: SRI LANKA: *Comanor* 778 (Mi). CHINA: Fukien: P'ei 2753 (Mi). Kiangsu: Keng 1632 (Mi). Kwangtung: Tsui 617 (Mi). Szechuan: Fang 9277 (Mi). CHINESE COASTAL ISLANDS: Hainan: Chun & Tso 43701 (Mi); Lei 700 (Mi); Wang 32749 (Mi). HONG KONG: Chan 1074 (Mi), 1084 (Mi); Taam 1728 (Mi). TAIWAN: Gressitt 461 (Mi); Tanaka & Shimada 17878 (Mi).

VITEX NEGUNDO var. *CANNABIFOLIA* (Sieb. & Zucc.) Hand.-Mazz.

Additional bibliography: Mold., *Phytologia* 51: 265--266. 1982.

Additional citations: CHINA: Kwangsi: Wan & Chow 79016 (Ac).

VITEX NEGUNDO var. *HETEROPHYLLA* (Franch.) Rehd.

Additional bibliography: Willd. in L., *Sp. Pl.*, ed. 4, 3 (2): 392. 1802; Everett, N. Y. Bot. Gard. *Illust. Encycl. Hort.* 10: 3514 & 3515. 1982;

For Everett's (1982) cultural notes for this plant, see under *V. negundo* (above).

VITEX NEGUNDO var. *INTERMEDIA* (P'ei) Mold.

Additional bibliography: Mold., *Phytologia* 51: 265 & 266. 1982.

The leaflets on Lau 20133 are almost all toothed. The corollas on Chan 1120 are said to have been "light-purple with darker dots on the lower lobe" when fresh.

Additional citations: CHINA: Kwangsi: Chiao 18774 (Mi).

Kwangtung: Lau 20133 (Mi); Tsui 453 (Mi). Szechuan: Fang 4629 (Mi). HONG KONG: Chan 1120 (Mi).

VITEX ORINOCENSIS var. *MULTIFLORA* (Miq.) Huber

Additional bibliography: Mold., *Phytologia* 51: 269--270 & 280. 1982.

Recent collectors describe this plant as a tree, 8--18 m. tall,

the trunk to 35 cm. in diameter at breast height, the filaments blue, and the anthers dark-blue or purple, the immature fruit green in November. The corollas are said to have been "lilac with yellow centers" on Daly & al, 1388 and "pétalas azul pálidas, labelo azul mais escuro com linhas brancas (guias para néctar) passando dentro da garganta de corola, tubo de corola lilás" on Nelson 734. They have found it growing in sandy soil, flowering and fruiting in November.

Additional citations: BRAZIL: Acre: B. Nelson 734 (N). Pará: Daly, Callejas, Silva, Taylor, Rosario, & Santos 1385 (Ld), 1388 (Ld).

VITEX PARVIFLORA A. L. Juss.

Additional bibliography: Everett, N. Y. Bot. Gard. Illust. Encycl. Hort. 10: 3515. 1982; Mold., Phytologia 51: 257, 261, & 270--271. 1982.

Chan refers to this plant as a tree, 8 m. tall, and found it in flower and fruit in July, the corollas "purplish-blue, hairy in the throat".

Additional citations: HONG KONG: Chan 1135 (Mi).

VITEX PEDUNCULARIS Wall.

Additional & emended bibliography: Brandis, Indian Trees, imp. 3, 505 (1911) and imp. 5, 505. 1971; Mold., Phytologia 51: 271. 1982.

Additional citations: CAMBODIA: Pierre 549 (Mi).

VITEX PINNATA L.

Additional synonymy: *Vitex glabrata* Ridl., in herb. [not *V. glabrata* Blume, 1956, not R. Br., 1810, nor F. Muell., 1895, nor sensu Kaneh., 1979].

Additional & emended bibliography: Willd. in L., Sp. Pl., ed. 4, 3 (2): 391 & 393. 1802; Brandis, Indian Trees, imp. 3, 504 (1911) and imp. 5, 504. 1971; Mold., Phytologia 51: 272--273. 1982.

The Shimizu & al. collection, cited below, exhibits no bracts at all in the inflorescence, but I assume that because of its advanced stage of growth they were there but have since fallen off.

Additional citations: THAILAND: Congdon 30 (Ac), 211 (Ac); Geesink, Hattink, & Charoenphol 7294 (Ac); Shimizu, Toyokuni, Koyama, Yahara, & Santisuk T.18006 (Ac).

VITEX PSEUDOLEA Rusby

Additional bibliography: Mold., Phytologia 51: 273. 1982.

The Vargas 17755, distributed as *V. pseudolea*, is not verbenaceous.

VITEX PYRAMIDATA B. L. Robinson

Additional bibliography: Mold., Phytologia 51: 273--274. 1982.

Oliver and his associates describe this plant as a tree, 6 m. tall, with "blue" corollas and "fruit 2-seeded by abortion".

They encountered it on sandy rocky hillsides at 5300 feet altitude, in flower and fruit in July.

Additional citations: MEXICO: Jalisco: *Oliver, Verhoek-Williams, & Andreasen* 667 (Ld).

VITEX QUINATA (Lour.) F. N. Williams

Additional & emended synonymy: *Cornutia quinata* Lour., Fl. Cochinch., ed. 1, 2: 2: 387. 1790. *Vitex rotundifolia* var. *heterophylla* (Roxb.) Mak., in herb.

Additional & emended bibliography: Lour., Fl. Cochinch., ed. 1, 2: 387. 1790; Brandis, Indian Trees, imp. 3, 504. 1911; Mak., Illust. Fl. Nipp. 186. 1940; Brandis, Indian Trees, imp. 5, 504. 1971; Everett, N. Y. Bot. Gard. Illust. Encycl. Hort. 10: 3515. 1982; Mold., Phytologia 51: 268, 274, & 282. 1982.

The alleged Makino trinomial, listed in the synonymy (above), apparently based on *V. heterophylla* Roxb., is obviously based on a misinterpretation of Makino's *V. rotundifolia* var. *heterophylla* published in his Illust. Fl. Nipp. (1940), which actually is a synonym of *V. trifolia* var. *subtrisecta* (Kuntze) Mold., although it has by some authors been applied to what we now call *V. trifolia* var. *simplicifolia* Cham. It has nothing to do with *V. quinata*.

The Curran collection, cited below, is sterile and exhibits some unifoliolate leaves, although most of its leaves are 4-foliate. It is placed here tentatively because it does not seem to be *V. turczaninowii* Merr., as previously determined. The same is true of Merrill 2196, also cited below, with its small, short inflorescences and small, shiny leaves. The *Ching* 5552, *Herb. Canton Chr. Coll.* 12613, *Keng* 1369, and *Pételot* 963, cited below, were previously erroneously cited by me as var. *puberula* (H. J. Lam) Mold.

Additional & emended citations: CHINA: Kwangsi: *Ching* 5552 (W--1248671). Kwangtung: *Peng, Tak, & Kin* s.n. [*Herb. Canton Chr. Coll.* 12613] (W--1248228). VIETNAM: Tonkin: *Pételot* 963 (W--1759227). TAIWAN: *Keng* 1369 (W--2035969). PHILIPPINE ISLS.: Luzon: *Curran, Philip. Forest Bur.* 10338 (W--708781); (W--437144).

VITEX RAPINI f. *DENTATA* Mold.

Additional bibliography: Mold., Phytologia 49: 460. 1981.

Baumann describes this plant as an "Arbuste de 2 m, forme de jeunesse" and found it growing in the "Maquis serpentineux de montagne" at 900 m. altitude.

Additional citations: NEW CALEDONIA: *Baumann* 8243 (W--2934930).

VITEX SIAMICA F. N. Will.

Additional bibliography: Mold., Phytologia 51: 275--276 & 344. 1982.

Congdon describes this plant as a tree with light-brown bark, the inner bark reddish-brown, the corolla 2-lipped, with yellow in the throat, the stamens 4, 2 long and 2 short, the anthers black, and the style as long as the stamens, bifid at the tip, and found the plant in flower in July, growing on limestone.

Additional citations: THAILAND: Congdon 733 (Ac).

VITEX SPRUCEI Briq.

Additional bibliography: Sandw., Kew Bull. Misc. Inf. 1930: 157. 1930; Mold., Phytologia 51: 278. 1982.

VITEX STAHELII Mold.

Additional bibliography: Mold., Phytologia 51: 248, 278--280, & 289. 1982.

González refers to this plant as a tree, 12--15 m. tall, and found it in fruit in August, growing at 400 m. altitude. Material has been misidentified in herbaria as possibly representing something in the *Caryocaraceae* or the *Euphorbiaceae*.

Additional citations: VENEZUELA: Falcón: A. González 1094 (E--2735465).

VITEX TRICHANTHA J. G. Baker

Additional synonymy: *Vitex trichanthera* J. G. Baker ex Mold., Phytologia 51: 286, sphalm. 1982.

Additional bibliography: Mold., Phytologia 51: 286. 1982.

VITEX TRIFLORA Vahl

Additional bibliography: Willd. in L., Sp. Pl., ed. 4, 3 (2): 390. 1802; Mold., Phytologia 51: 259, 280, & 286--290. 1982.

VITEX TRIFLORA var. *KRAATZII* Huber

Additional bibliography: Mold., Phytologia 51: 330. 1982.

Recent collectors describe this plant as a "shrub or coarse herb to 1 m. tall" [Daly & al. 951], "procumbent vine" [Daly & al. 1107], small tree to 5 m. tall [Calderón & al. 2804], or even taller, and have found it growing on terra firme in rainforests and in the disturbed edges of campinarana, in flower in July and October, and in (green) fruit in October. The corolla is said to have been "lilac" on Calderón & al. 2804 and "purple & white with purple streaks in the interior" on Daly & al. 951.

Material has been misidentified and distributed in some herbaria as *V. trifolia* L.

Additional citations: BRAZIL: Para: Daly, Callejas, Silva, Taylor, Rosario, & Santos 951(Ld), 1107 (Ld). Rondonia: Calderón, Monteiro, & Guedes 2804 (Ld).

VITEX TRIFOLIA L.

Additional & emended bibliography: Willd. in L., Sp. Pl., ed. 4, 3 (2): 392. 1802; Miq., Journ. Bot. Néerl. 1: 115. 1861; Powell in Seem., Journ. Bot. 6: 359. 1868; Horne, Year Fiji 269. 1881; Drake del Castillo, Illust. Fl. Ins. Mar. Pacif. 260. 1892; Shirasawa, Bull. Agric. Tokyo 2: 270. 1895; Brandis, Indian Trees, imp. 3, 504. 1911; Masamune, Trans. Nat. Hist. Soc. Formos. 22: 220 & 224. 1932; Hosokawa, Trans. Nat. Hist. Soc. Formos. 23: 233. 1933; Brandis, Indian Trees, imp. 5, 504. 1971; Hsiao, Fl. Taiwan 4: 434. 1978; Lord, Trees Shrubs Austral. Gard., ed. 5, 232 & 321. 1978; Everett, N. Y. Bot. Gard. Illust.

Encycl. Hort. 10: 3514--3515. 1982; Mold., Phytologia 51: 330--355. 1982.

Additional illustrations: Hatusima & Yoshinaga, Bull. Fac. Agr. Kagosh. Univ. 2: 109, pl. 15, fig. 2. 1970.

Powell (1868) records the vernacular name, "namulega", for this plant in Samoa, while Hu (1981) lists "ching-tzu", "man-ching-tzu", and "seashore vitex" in China, where it is known as "Fructus Viticis" in materia medica.

Bolkhovskikh (1969) records the chromosome numbers as 26, 32, and 34. This discrepancy may possibly be due to the use of material representing not only the typical form of the species, but also some of the varieties or even of related species. The matter certainly needs further more careful cytologic study after the identity of the material used is carefully determined by a specialist in the group, with the preservation, in all cases, of herbarium vouchers!

It is perhaps worth noting that the Masamune (1932) reference in the bibliography (above) is sometimes cited as "121: 220 & 221", but the volume number is "22" -- "121" is merely the issue number.

The Daly & al. 951, distributed as *V. trifolia*, actually is *V. triflora* var. *kraatzii* Huber, while A. C. Smith 6610 is *V. trifolia* var. *subtrisecta* (Kuntze) Mold.

VITEX TRIFOLIA var. *BICOLOR* (Willd.) Mold.

Additional bibliography: Mold., Phytologia 51: 338--340 & 343--352. 1982.

Stone & Streimann refer to this plant as a "crooked little tree on beaches" on Manus island, with "lilac" corollas in June.

Additional citations: BISMARK ARCHIPELAGO: Manus: Stone & Streimann LAE.53720 (W--2917623).

VITEX TRIFOLIA var. *SIMPLICIFOLIA* Cham.

Additional & emended bibliography: Willd. in L., Sp. Pl., ed. 4, 3 (2): 390. 1802; Miq., Journ. Bot. Néerl. 1: 115. 1861; Drake del Castillo, Illust. Fl. Ins. Mar. Pacif. 260. 1892; Shirasawa, Bull. Coll. Agric. Tokyo 2: 270. 1895; C. K. Schneid., Dendrol. Winterstud. 188, 198, 201, & 267, fig. 191 a--g. 1903; Masamune, Trans. Nat. Hist. Soc. Formos. 22: 220 & 224. 1932; Hosokawa, Trans. Nat. Hist. Soc. Formos. 23: 233. 1933; Masamune, Mem. Fac. Sci. Agr. Taihoku Univ. 11, Bot. 4: 388. 1934; Takenouchi, Journ. Nat. Hist. Fukuoka 2: 15. 1936; Mak., Illust. Fl. Nipp. 186, fig. 558. 1940; Jinno, Jap. Journ. Genet. 31 (5): 147--150. 1956; Everett, N. Y. Bot. Gard. Illust. Encycl. Hort. 10: 3515. 1982; Mold., Phytologia 51: 339, 341, 344, & 352--355. 1982.

Additional & emended illustrations: Shirasawa, Jap. Laubh. Winterstud. 2: 270. 1895; Kanehira, Formos. Trees, ed. 2, 654, fig. 609. 1936; Mak., Illust. Fl. Nipp. 186, fig. 558. 1940; Liu, Illust. Nat. Introd. Lign. Pl. Taiwan 2: 1231. 1962; Pope, Man. Wayside Pl. 196, pl. 111 (in part). 1968; Hatusima & Yoshinaga, Bull. Fac. Agr. Kagosh. Univ. 2: 109, pl. 15, fig. 3. 1970;

Mold. in Menninger, Flow. Vines [335] & 339, ph. 285 & 286. 1970; Huang, Pollen Fl. Taiwan 163, fig. 15--17. 1972; M. R. Henderson, Malay. Wild Fls. Dicot. 1: 387, fig. 357. 1974.

Henderson (1974) describes this plant well: "A creeping shrub with long runners, rooting from the stems and flowering on short, upright, leafy shoots, leaves rather variable in size, but usually rather small and broad, widest at or above the middle, tip rounded or sometimes broadly pointed, base tapered, from less than 1/2 in. long and about 1/4 in. to 1 1/2 in. wide, upper surface pale green, lower surface ashy grey, leaf-stalk about 1/4 in. long, flowers in narrow inflorescences up to about 5 in. long from the ends of the upright shoots, calyx about 1/8 in. long, grey, with 5 very short teeth, corolla nearly 1/2 in. long, lilac blue, 2-lipped, stamens 4, fruit a round, black berry [actually a drupe] nearly 1/4 in. long, surrounded by the enlarged [fruiting-] calyx, which eventually splits along one side. On sandy sea-shores."

Backer & Bakhuizen (1965) say: "All leaves simple or consisting of 1 (whether or not deeply incised) leaflet. Stem creeping, copiously rooting from the nodes, emitting many erect, short, flowering branchlets; panicle terminal, narrow, 1--9 cm. long; cymes (lower often in upper leaf-axils) on a 1--4 cm long peduncle, 1--4-flowered; corolla bluish violet, inside (from the insertion of the stamens up to half the length of the lower lip) densely white-hairy; tube c. 3/4 cm; median segment of lower lip c. 1/2 cm; bases of filaments villous; drupe globose, dry, black, c. 1/2 cm diam.; pyrene corky. Leaves oval-elliptic-obovate, obtuse or subrotundate, entire or a few of them 2--3-partite, densely white-tomentose especially on the lower surface, 1 1/2 -- 4 1/2 cm; petiole 1 1/2 -- 3 1/2 cm. 0.06--0.30 (height; length 1--2 m)." He states that in Java it blooms throughout the year.

Shirasawa (1895) describes its winter characters as "Knospen klein, etwas entfernt oberhalb der Blattanrabe stehend, grau behaart. Die jüngeren Theile der Zweige dicht behaart wie mit Sammet bekleidet, graubraun, 4 bis 5 kantig. Mark weit, eckig. Kriechender Strauch nicht aufrech stehend."

Miquel (1861) found it growing along roadsides in Fukien, "avec des fleurs bleues", along with *V. negundo* L. Van Steenis (1957), after a summation of the history of this taxon in taxonomic botany (as quoted by me in Phytologia 17: 115. 1968), continues as follows: "The conclusion in my opinion is therefore that it is a clearcut ecological (littoral) race, exclusive of the *V. trifolia* population. It should therefore be assigned subspecific rank which is accordingly proposed here. I have chosen a new name in the subspecific rank as the epithet *ovata* is misleading and the varietal epithets do not refer to its peculiar habitat. The technical description runs: rami prostrati, radicantes. Folia simplicia, obovata, rotundata. Type: *Bloembergen 3894* (L)." He gives its distribution as determined by specimens in the Leiden herbarium as "Japan: Nagasaki, Yokohama. China: Hongkong. Malaysia: Malay Peninsula: Kuala Kemaman, K. Pahang, K. Trengganu, Pahang Tua, Corner l.c.; Banka; W. Borneo: Dunselman l.c.; S. Java;

Patjitan; Madura Isl.: Sergang; Salayer Isl.; Sila Isl.; Mangoli; Lesser Sunda Isl.: Savu, Kisar, Timor; S. New Guinea: Merauke; Philippines: Luzon (Camarines Norte pr. Daet, Zambales pr. Subig, Batangas pr. Bauang), Mindoro, Panay (Antique), Sibuyan (Capiz Pr. Magellanes); Pacific: Bonin Isl. (Rurutu, pr. Murai), Hawaii (Oahu)."

Recent collectors describe the plant as a prostrate, decumbent, procumbent, creeping, or sprawling to ascending or even erect shrub, rarely scandent ["tangled prostrate vine"; "aromatic vine lying flat on the shore"], 0.5--2 m. tall, densely gray-white puberulent throughout, very aromatic; stems issuing from a root-stock, woody, to 2 cm. in diameter, rooting at the nodes, sometimes forming large woody mats; branches tetragonal, elongate, the ultimate flowering ones and the twigs ascending to erect; leaves grayish or gray-green to blue-green, aromatic, often covered by salt spray, the blades herbaceous, broadly ovate to broadly elliptic, succulent, 2--5 cm. long, 1.5--3 cm. wide, apically obtuse or rounded, marginally entire, basally abruptly acute, green or deep-green and thinly puberulent above, densely whitish- or grayish-puberulent or "frosted-white" beneath; panicle terminal, 4--7 cm. long, dense-flowered, with very short branches; flowers very pretty and attractive, opening late in the afternoon; corolla about 13 mm. long, the tube 8 mm. long, externally covered by white hairs, the face 15 mm. in diameter from lower to upper lip, the lower lip very much the larger; stamens 4; anthers sagittate, purple; pollen white; style 15 mm. long; fruit small, globose, 5--7 mm. wide, basally enclosed by the persistent fruiting-calyx, greenish-white to black or brown.

The corollas are said to have been "blue" on Hallier 4230d, Liang 64027, Maconochie 525, Sinclair 7526, Sivaraman 485 & 485a, Stoddart 4815, and Webster & al. 13843, "light-blue" on Hallier 4230a and Koyama 7311, "lilac-blue" (Henderson, 1974), "lavender-blue" on Hyland K.470, "blue-violet" on Fosberg 37605, "bluish-purple" on Fosberg 53663 and Hatheway & Caindec 139, "bluish-purple with a white patch at the center of the lower lip" on Hu 12286, "pale-lilac" on Chippendale 8159, "lilac" on Blake 22530 and Stoddart 4189, "light-violet or bluish-lavender" on Fosberg 36971, "lavender-purple" on Fosberg 27125, "purplish" on Herbst & Spence 5733, "light-purple" on Hu 5894 and Koyama 7043, "purple" on Beauchamp 932, Cowan 1060, Hiroe 14502, Perry 1223, Soepadmo KLU.9116, and Stoddart 5074, "lavender" on Hu 8635 and Specht 677, "violet" on Dress 1518 and Fosberg 38583, "dark-blue within and light-coerulean blue outside" on Hallier 4230, "the tube gray-blue outside, limb and inside of tube lavender-blue" on Biegel 3949, and "lower lip rich-violet with two short white vertical stripes at the throat, the other petals violet" on Iltis H.301.

Collectors have found the plant growing along shores in sand and sun, on sandy seashores and dunes, in strand areas, on sand cays, on the seaward parts of dunes, on sand-dune "foreshores", on sand in grass cover, in stabilized sand areas behind dunes, on sandy flats among grass with no shrubs present, on concrete dams,

and along rocky roadsides, from sealevel to 10 m. altitude, in flower from March to October and December, in fruit in January, July, October, and November.

Suauki & Nakanishi (1971) report finding the plant on stable sandy beaches with *Calystegia soldanella*, *Ixeris repens*, and *Carex kokomugi*. Ohwi (1965) reports it from "sandy places by the sea" on Honshu, Shikoku, Kyushu, Korea, Taiwan, the Bonin Islands, and the Ryukyu Islands to southern Asia, the Pacific Islands, and Australia.

Fosberg reports it "occasional on limestone rocks in low beach scrub", "common at edge of littoral scrub", "in sand near top of beach", and "common in edges of beach scrub on sand ridges back of beaches". Koyama refers to it as "Forming thickets with other shrubs along rivers" and as "quite common on sand dunes. forming long pure stands".

Beauchamp encountered it "in sand at upper edge of beach". It often grows among *Ipomoea pes-caprae*. On the island of Oahu the Degeners describe it as "pressing toward the ocean and being repulsed by winter storm waves", while Stone found it "on rocky slopes and sand on rocky shores with tidepools, *Acetabularia* in the pools.

Soepadmo refers to it as inhabiting "sandy soil of dry open lands" in Malaya. Stoddard describes it as a "common woody herb", "prostrate creeper", "common in tern colonies on bare ground of sand cays", and "occasional on seaward beach crests" in the Great Barrier Reef, but "uncommon" on Fife Island.

Hatheway & Caindec describe it as "sometimes erect, sometimes decumbent, 1--3 feet tall, dominant in lea of large dunes" on Oahu.

Common and vernacular names recently reported include "agubaraao", "agubarau", "beach vitex", "ching-taü", "creeping vitex", "daldalaki", "danglá-ti-baybai", "dunglá", "hai-po'-kiu", "hamago", "hamagô" [=beach creeper], "hama-sikimi", "hogagii", "hogi", "king-tsse", "kolokolo-kahakai", "kon'ti sorn talay", "lagundi-dágat", "lagunding dagat" [lagundi = *V. trifolia*, dagat = ocean], "lagunding-gapang", "manawanawa", "manawanewa", "man-ching", "man-ching-taü", "man-ching-tsü", "oval-leaved chaste-tree", "péh-po'-kiu", "pohinahina", "polinalina", "seashore vitex", "simple-leaf chaste-tree", "simple-leaf shrub chaste-tree", "Taiwan-hamagô", and "vitex que serpea".

Huang (1972) describes the pollen grains as prolate to prolate-spheroidal, 27--40 x 19--33 μ , based on Huang 4177, while Ikuse (1956) gives the dimensions as 27--29 x 30--32 μ .

Jinneo (1956) gives the chromosome number as 32, and in this Chuang & al. (1963) concur.

Sweet (1826, 1830) avers that the variety was introduced into cultivation in England in 1796 from China.

Merrill (1918) states that "This species is not uncommon on sandy beaches along the seashore, and is widely distributed in the Philippines."

[to be continued]

A NEW SPECIES OF LABORDIA (LOGANIACEAE)

HAWAIIAN PLANT STUDIES 115

Harold St. John

Bishop Museum, Box 19000A, Honolulu, Hawaii 96819, USA

The genus Labordia (Loganiaceae), as now known, has 23 species and 59 variations in the Hawaiian Islands. They are trees or shrubs of the rain forests, and are found on all of the larger islands of the group. The present novelty was discovered on the swampy, forested summit of the crest of the Waianae Mountains of Oahu.

Labordia nervosa sp. nov. (sect. Rabdolia). Fig. 1.

Diagnosis Holotypi: Frutex 2.3 m altus est, novellis hirsutis, ramulis glabratis, stipulis 3-4 mm longis late ellipticis intrapetioleis, petiolis 4-8 mm longis, laminis 4.3-8 X 1.4-3.3 cm subcoriaceis fusiformibus supra glabris infra pallidis et in nervis curvate hirsutis, floribus 1-2 in axilibus superis, pedicellis 4-5 mm longis dimidio apicali hispido, calycibus 15-17 mm longis tubo 3 mm longo hispido, lobis 12-14 mm longis late ellipticis praesertim in basi hispidis, corollis 27 mm longis luteis tubo 17 mm longo, 5 lobis 8 mm longis lineari-lanceolatis, filamentis 1 mm longis, antheris 2 mm longis lineari-ellipsoideis.

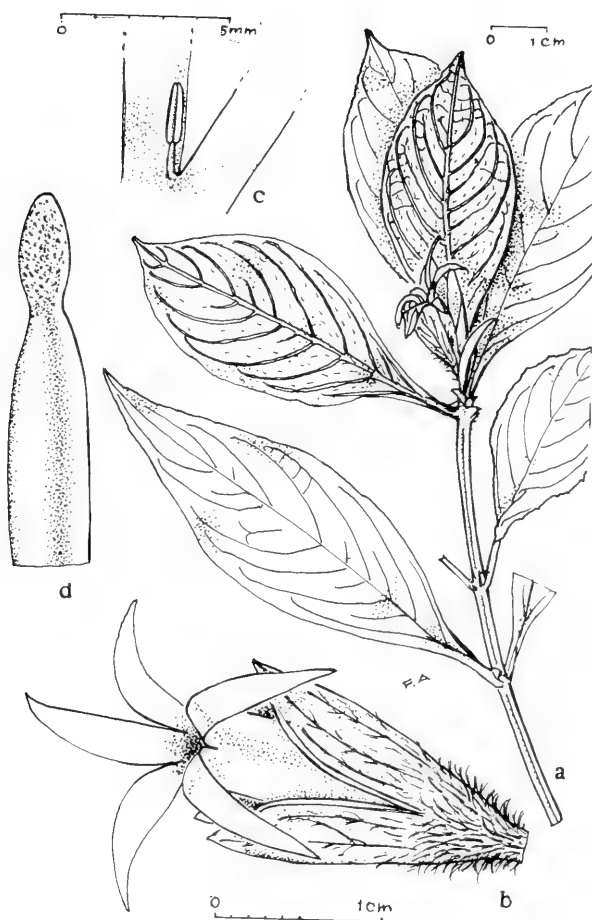
Description of Holotype: Shrub 2.3 m tall; young shoots hirsute; branchlets angular, glabrate; internodes 12-45 mm long, square, glabrate; nodes enlarged; leaf scars 4 mm wide, hemispheric, pale brown, elevated; bundle scars 5, small; stipules 3-4 mm long, broadly elliptic, intrapetiole; petioles 4-8 mm long, early glabrate, channeled above; blades 4.3-8 X 1.4-3.3 cm, subcoriaceous, fusiform in outline,

subacuminate, above dark green, smooth, glabrous, below pale greenish, curving hirsute on the veins, secondary veins 9-10 in each half, curved ascending; flowers 1-2 in upper axils; pedicel 4-5 mm long, hispid on the apical half; calyx 15-17 mm long, the tube 3 mm long, funnel-form, densely hispid, the lobes 12-14 mm long, leaf-like, broadly elliptic, subacute, densely hispid at base, and sparsely so up the ascending veins, within hispid on the basal half; corolla 27 mm long, yellow, the tube 17 mm long; 5 lobes 8 mm long, linear lanceolate; ovary 7 mm long, narrowly ellipsoid; stigma 3 mm long, ellipsoid; stamens borne in the sinuses between the corolla lobes; filaments 1 mm long; anthers 2 mm long, linear ellipsoid.

Holotypus: Hawaiian Islands, Oahu, Waianae Mts., Mt. Kaala, near summit, 4,000 ft alt., Aug. 14 1927, L. H. MacDaniels 931 (BISH).

Discussion: L. nervosa is a member of the section Rabdolia, as is its closest relative, L. glabra Hbd., var. latisepala Sherff, of east Maui, a var. with the stems glabrous; stipules 1-1.5 mm long; petioles 12-14 mm long; blades 5-7 X 2-2.4 cm, narrowly fusiform in outline; pedicel 3 mm long, glabrous; calyx 8 mm long, the tube 1.5 mm long, the lobes 6-7 mm long, glabrous, only the midrib evident; and the corolla 14-15 mm long, the tube 8 mm long, sparsely hirsute. L. nervosa has the branchlets at first hirsute, then glabrate; stipules 3-4 mm long; petioles 4-8 mm long; blades 4.3-8 X 1.4-3.3 cm, fusiform in outline; pedicel 4-5 mm long, hispid on the apical half; calyx 15-17 mm long, the tube 3 mm long, the lobes 12-14 mm long, the midrib and 6 lateral veins conspicuous; and the corolla 27 mm long, the tube 17 mm long, glabrous

The epithet nervosa refers to the nerved calyx lobes.



LEGEND

Fig. 1. Labordia nervosa St. John, from holotype.

a, habit, X 1; b, flower, X 3; c, ovary, X 10.

BOOK REVIEWS

Alma L. Moldenke

"A COUNTRYMAN'S FLOWERS" by Hal Borland with photographs by Les Line, xiii & 187 pp., 85 color photo pl. Borzoi Books by Alfred A. Knopf, Inc., New York, N. Y. 10022. 1981. \$22.50.

What beautiful, soul-satisfying, nature appreciative, and both thought-stimulating and mind-pacifying feelings reward the viewer of these 85 paired essays and photographs of the chosen blooms from the southern limits of the Berkshire Mountains near the Housatonic River! They are grouped as those around the doorway, along the roadside, in the old pasture and by the bog and brookside. The left hand page gives the common and scientific names, often the family and/or common familial relatives and some descriptive and use notes presented in charming fashion. If I did not enjoy poring over this book so long I might not have noticed such tiny flaws as the printing of the *Houstonia caerulea* picture without its characteristic sky-blue corolla color and the black-eyed-susan, originally from the prairie states, mis-named *Rudbeckia hirta* instead of its now accepted name, *R. serotina*. What a lovely gift prospect this book is, either to give or to receive!

"WOOD IDENTIFICATION HANDBOOK: Commercial Woods of the United States" by Marshall S. White, 80 pp., 46 b/w fig. & photo., 32 tab. Charles Scribner's Sons, New York, New York 10017. [1981] 1982. \$9.95.

"This [useful] handbook describes a reliable method of differentiating between woods using only the characteristics of the wood itself" seen in cross-section with an ordinary hand lens and which can be smelled, tasted or felt. For 32 woods prominent in the lumber industry of the United States the common and scientific names are given and the ranges, uses and identifying wood features are described. An ingenious illustrated wood identification key is also provided. Obviously this book should prove valuable to those in the lumber and furniture businesses - especially to buyers - and also to wood hobbyists, antique dealers, museum curators, etc. Advertized with this book is a wood identification kit of actual wood samples sized 5/8" x 1 3/4" x 4" and corresponding to the 30 photos and descriptions in the text. They would offer texture and color to aid recognition.

"PLANT AND INSECT MYCOPLASMA TECHNIQUES" edited by M. L. Daniels & P. G. Markham, 369 pp., 54 b/w photo., 7 fig. & 25 tab. Croom Helm Ltd., London SW11 & Halsted Press of John Wiley & Sons, Inc., New York, N. Y. 10158. 1982. \$49.95.

"Only 14 years have passed since the first publication appeared which implicated mycoplasmas as agents of plant disease", such as clover phyllody, peach and aster yellows, and corn stunt. All these are members of Class *Mollicutes* and Order *Mycoplasmatales* with its 3 families. The electron microscope shows better than the light one the helices that determine shapes, and a single chromosome, ribosomes and granular material. The only membrane is an enzymatically active cell one in these wall-less prokaryotes. They seem to have a "very wide distribution in nature"; some pathogens, many harmless, some possibly beneficial to the hosts, some free-living, and many in arthropods serving as reservoirs. To date, breeding for resistance to M L O (mycoplasma-like organisms) diseases is an attractive proposition that "has met with little success so far". Among the 11 chapters by different authors are also some on insect vectors, physicochemical and serological characterizations, culture media and methods. This book provides a good general and practical introduction to this topic.

"THE GARDEN OF EDEN - The Botanic Garden and the Re-Creation of Paradise" by John Prest, ii & 122 pp., 8 color pl. & 72 half-tones. Yale University Press, New Haven, Connecticut 06520. 1982. \$25.00.

This is a fascinating, beautifully presented and carefully researched study of the nature and purpose of the great European Botanic Gardens, such as those in Padua, London, Montpellier, Oxford, Paris and Uppsala. Typically rectangular, walled, provided with a central spring and subdivided, they showed by families all kinds of plants that could grow there from Europe, Asia, Africa and the then newly discovered New World. The explorers were seriously hunting also for the original Garden of Eden that was believed to have been saved from destruction by the Flood. When continued search proved fruitless, "man began to think, instead, in terms of bringing the scattered pieces of creation together into a Botanic Garden, or a new Garden of Eden." It was not until quite some time later "that in the Botanic Garden, one stands in the presence of the beginnings of modern science, the collection of data, and the patient, detailed observation of causes and their effects." Probably because the author is an historian and not a botanist the first letter in the generic name of *Artemisia vulgaris* and of a few other genus names is not capitalized. Similarly the apricot was not even considered as a likely candidate for the forbidden fruit offered to Adam.

"SOCIAL INSECTS" Volume I edited by Henry R. Hermann, xv & 437 pp., 81 b/w fig., 35 photo., & 21 tab. Academic Press. Inc., Publishers, New York, N. Y. 10003. 1979. \$44.50.

This is a very fine study composed of 8 papers collating "the works of modern researchers working in the field of insect socio-biology....particularly through genetic, behavioral and evolutionary pathways" with the introductory survey paper by the editor. "Eusociality tends to occur more consistently than presociality throughout taxonomic categories, such as families and superfamilies, and usually involves the development of structural features that indicate degrees of social behavior. It exists throughout the order *Isoptera* [single ancient origin] and in some families of the hymenopterous superfamilies *Vespoidea* and *Apoidea* [more diverse and of several origins], as well as in all *Formicoidea*." Territorial manifestations in social insects are mostly at the colony level, providing such concepts of social ethology as "supraorganism". There are three chapters with many descriptive details on Caste Differentiation and Division of Labor, on Genetics of Sociality and on Larvae of the Social *Hymenoptera*. The last paper is on Social and Evolutionary Significance of Social Insect-Symbionts, "many of whom have found many ways to exploit the social releasers of the societies....[which] include the use of chemicals for appeasement and adoption and.....Wasmannian [tactile] mimicry."

"THE BOOK OF CALENDARS" edited by Frank Parise, vi & 387 pp., Facts on File, New York, N. Y. 10016. 1982. \$29.95.

This is encyclopedic information almost impossible to find in toto in any good modern encyclopedia in any language: therefore its great value on the end of encyclopedia shelves in school libraries, etc. When early peoples passed from primitive stages of reckoning orally or mentally the passing of seasons to recording measures of time for agricultural, business, governmental, domestic, ritual and other reasons, lunar and/or solar based calendars were established. "The Chinese calendar is the longest unbroken sequence of time measurement in history. Its epoch is said to be 2953 B.C." It has been adopted by the Koreans and the Japanese. About two dozen ancient calendars -- such as Babylonian, Macedonian, Hebrew, Armenian, Islamic, Zoroastrian, Early North European -- are all described and then in conversion tables equated with the Julian and then the modern Gregorian date equivalents. The bulk of the book consists of these tables. There are interesting accounts of the interim French Revolutionary Calendar with 12 D'Eglantine named months such as venter, floreal, fructidor, and the interim Soviet Calendar with numbered 5-day weeks followed by one day of rest.

"ANNUAL REVIEW OF ENTOMOLOGY" Volume 27 edited by Thomas E. Mittler with Frank J. Radovsky & Vincent H. Resh, vi & 503 pp., 9 b/w fig. & 8 tab. Annual Reviews, Inc., Palo Alto, California 94306. 1982. \$22.00 U.S.A. & \$25.00 foreign.

The 18 papers in this volume cover a wide range of topics, disciplines and approaches, starting with "Spider Courtship and Mating" with the male's double acts of seminal discharge (first semen ejection from a genital pore onto sperm web and then pickup by pedipalps, second semen ejaculation from pedipalps into female during copulation) and continuing with papers on tick cuticle, on mite pests (serious parasites like varroa, phoretics and house guests) of the honeybee, on biochemistry of insect venoms, and on "A Perspective on Systems Analysis in Crop Production and Insect Pest Management". There is much important material presented in this volume.

"THE WHY AND HOW OF HOME HORTICULTURE" by Darrel R. Bienz, x & 513 pp., 393 b/w fig. & photo., 6 maps & 58 tab. W. H. Freeman & Company, San Francisco, California 94104. 1980. \$17.95.

This is the very best horticulture book for indoor and outdoor vegetable, fruit, flower and evergreen home gardening. It is planned for the inquisitive for intelligent explanations lead to more effective skills and consequent "green thumb" results. Actually the content of this book was first presented in an "elective, introductory horticulture course for non-majors as distinct from one for students of commercial horticulture." These latter should also appreciate this book for the first 13 explanatory chapters and the 14th, or last, entitled "The Handbook" with its detailed instructions for gardening procedures.

"LIVING WITH PLANTS -- A Gardener's Guide to Practical Botany" by Donna N. Schumann, xx & 327 pp., 214 b/w fig., 181 photo., 13 tab. & 8 maps. Mad River Press, Inc., Eureka, California 95501. 1980. \$14.95 paperbound.

This is a simple, direct, enthusiastically written botany text, usable in extension courses, in colleges and in the general education courses in botanical gardens. "Since the book is intended for non-professional readers, there is no chemistry, physics, or mathematics used in any technical way, and no previous background in botany, agriculture, or horticulture is assumed." A couple of clever cartoons therefore substitutes for the chemical story of gibberellin → cytokinin → germination. After an introduction to a plant, soils, seeds, and vegetative propagation, readers are introduced to "the enemy" in the form of insect, nematode, fungus, to indoor lighting, to gardening in and out, to pruning and grafting and to landscape planning.

"ANNUAL REVIEWS OF PLANT PHYSIOLOGY" Volume 32 edited by Winslow. R. Briggs with Paul B. Green & Russell L. Jones, viii & 744 pp., 30 b/w fig. & 12 tab. Annual Reviews, Inc., Palo Alto, California 94306. 1982. \$22.00 U.S.A., \$25.00 foreign.

The prefatory chapter is a career-oriented autobiography by Philip F. Wareing as he retires from the University College of Wales, U. K. There follow 11 papers clustered around the topics of Molecules and Metabolism, 5 on Organelles and Cells, 3 on Tissues, Organs and Whole Plants, and 3 more on Population and Environment. This volume reports well many newer techniques, but correspondingly cannot offer many final answers to detailed questions raised. The full bibliographic information with each paper should be helpful for those readers wishing to study more in depth.

"DESERT ANIMALS -- Physiological Problems of Heat and Water" by Knut Schmidt-Nielsen, xix & 277 pp., 8 b/w photo. plates, 51 fig. & 36 tab. Dover Publications, Inc., New York, N. Y. 10014. 1979. \$5.00 paperback.

If the author and title seem familiar, it is because this is a republication of the well received Oxford University Press study first presented in 1964 and then corrected in 1965. The latter edition has been used in unabridged form except for a new, short, helpful preface by the author himself, summarizing "some significant developments that have taken place since the book was first written." There are also new literature citations "that add new information and increase our understanding of how desert animals function." "In the hot desert the camel exhibits a slow rate of water loss mainly because its fluctuating body temperature and the well-insulated body surface. This slow loss, in combination with an exceptional tolerance to dehydration of the body, permits the camel to withstand water deprivation for longer periods than any other mammal exposed to similarly hot conditions." Man, certain desert cattle, donkey, sheep, a few carnivores, rodents, lagomorphs, marsupials, birds and reptiles have been checked for their respective abilities to maintain their viability in hostile desert environments. The information obtained is very interesting and well presented.

947
52

PHYTOLOGIA

An international journal to expedite botanical and phytoecological publication

Vol. 52

November 1982

No. 3

LIBRARY

CONTENTS

NOV 19 1982

NEW YORK

GÓMEZ P., L. D., <i>Plantae mesoamericanae</i>	157
CUATRECASAS, J., <i>Miscellaneous notes on neotropical plants, XIV</i>	157
CUATRECASAS, J., <i>Studies in neotropical Senecioneae III. New taxa in Senecio, Pentacalia and Gynoxys</i>	159
CUATRECASAS, J., <i>Miscellaneous notes on neotropical flora, XV. New taxa in the Astereae</i>	166
MOLDENKE, H. N., <i>Notes on new and noteworthy plants. CLXI</i>	178
BEDELL, H. G., & REVEAL, J. L., <i>A synoptical review of a revised classification of Liliopsida (Magnoliophyta) as proposed by Dahlgren and Clifford</i>	179
MOLDENKE, H. N., <i>Additional notes on the genus Vitex. XXXVI</i>	184
MOLDENKE, A. L., <i>Book reviews</i>	212

Published by Harold N. Moldenke and Alma L. Moldenke

303 Parkside Road
Plainfield, New Jersey 07060
U.S.A.

Price of this number \$3.00; for this volume \$13.00 in advance or \$14.00 after close of the volume; \$5.00 extra to all foreign addresses and domestic dealers; 512 pages constitute a complete volume; claims for numbers lost in the mails must be made immediately after receipt of the next following number for free replacement; back volume prices apply if payment is received after a volume is closed.

PLANTAE MESOAMERICANAE NOVAE.VI.*

by Luis Diego Gómez P.
Museo Nacional, San José, Costa Rica

Isoetes tuerckheimii Brause in Urban, was described from Hispaniola and so far is only known from that Caribbean locality. A collection from Guatemala (Keeley & Keeley 7525 & 7527, 24.5 km NW of Quetzaltenango, 2840 m) may well represent this species. The guatemalan specimens have no peripheral strands, stomates are confined to the tips of the leaves and megaspores are 455-470 μ m, with thick, elevated commissures and very low papillae, all surfaces finely covered by minute filiform processes. Microspores have not been seen by me. This plant differs from *I. mexicana* Underwood, which it superficially resembles, by the absence of peripheral bundles and the size of the megaspores. It may well represent an undescribed species of quillwort, worth of closer examination.

Lycopodium orizabae Underwood & Lloyd, described from Veracruz and known also from Chiapas, has been collected in Nicaragua where it is apparently confined to the Cerro La Pimienta's cloud and elfin forest, 900-1180 m, J.J.Pipoly 6077 & A. Grijalva 365, both at MO.

Selaginella tanyclada Alston ex Crabbe & Jermy, has been recently described from Departamento Chocó, Colombia, so its presence in Panama was to be expected. A collection from Campo Tres, 3 miles NE of Altos de Pacora, 500-800 m, by T. B. Croat 22735 (MO), corresponds to this taxon and was erroneously identified as *S. articulata* (Kze.) Spring, which it somewhat resembles but *S. tanyclada* is glabrous throughout.

Selaginella centipediformis sp. nov. .Species heterophylla *S. bombycina* Spring affinis, sed foliis mediis acutis valde carinatis, margine anteriore denticulatis, inferiore glabris ad basim pauce ciliatis; foliis lateralibus glabris, minutissime denticulatis, dentibus apicibus mucronatis. Megaspores albae, 319-333.5 μ m, baculato-spinulosae.

Plant up to 30(35)cm tall. Stems glabrous, suberect from a short creeping base, 1.5-2 mm in diameter, always simple, stramineous, covered with homomorphic leaves only in the short, prostrate portions, with uniform, heteromorphic leaves throughout the rest, the old leaves are persistent, drying a silvery off-white or very pale cinnamon; rhizophores ventral, restricted to lower third, wiry; foliose part simple, unbranched or with 1-2 short, oblique branch near the apex. Lateral leaves perpendicular to stem, flat, the vein reaching the apex, 9-10 mm long, 1.8-2 mm wide, uniformly oblong, upper base rounded, lower base subtruncate, both with 2-6 teeth, teeth 22-33 μ m long, teeth are mucronate, mucro 6-7 μ m long and not persistent, margins minutely and distantly denticulate, apex rounded-obtuse with 2-3 short teeth. Median leaves overlapping their bases but directed outwards and leaving the stem visible along the middle of the two rows, acute, carinate, unequally cordate, 4 mm long, 2 mm wide, upper base rounded, lower base convex, upper margin denticulate, lower margin denticulate only at

*Partially funded by grants from CONICIT and The Tinker Foundation

the base and often near the apex. Strobili 1-1.5 cm long, 1.5-1.8 mm wide, single and perpendicular to stem, tetrastichous, mega and micro-spo-ophylls similar, 1.6-1.9 mm long, deltoid, strongly carinate, acuminate, margins denticulate. Megaspores 319-333.5 μ m, proximal faces with irregular bacilliform processes, these minutely spinulose.

Holotypus: La Fortuna hydroelectric project, in cloud forest along trail uphill behind camp; elev. 1200-1400 m. Terrestrial in forest. Province of Chiriqui, Panama, B. Hammel 2121 (MO).

Etymology: *centipediformis*= in the shape of a centipede, because of the appearance of the simple, uniform fronds.

The new species undoubtedly belongs in the group of *S. bombycina* and *S. tanyclada*. From the former it differs in the lack of cilia, in habit and altitudinal range; from the latter in its simple fronds, characters of the lateral and medial leaves, size and ornamentation of the megaspores.

Athyrium paramicola sp. nov. *Herba rheophila parva, rhizomate erecto, compacto, proliferans, dense paleaceo, paleis integris, brunneis, membranosis, anguste deltoideis, clathratis, 8 mm longis, 1 mm latis, vestito; stipitibus fasciculatis, proximis, 8-15 cm longis, 1.5-2 mm crassis, paleis rhizomatis sed lanceolatis ad basim pauciter obtectis. Lamina lanceolata, membranosa, bipinnata, vix 20 cm longa, e parte media 10 cm lata, pinnae 13-15-jugis, 2-3 basalibus oppositis, deinde suboppositis, apicalibus alternis, pinnulae 5-9-jugis, acroscopicarum longiores. Rachis laminarum glabra, obscure fractiflexa, costae glabrae, rectae, supra sulcatae, sulci marginibus hyalinis ad insertionem costarum dentis instructi. Indusium tenuiter membranaceum, hyalinum, laciniatum, laciniae tubulosae, 1-5-cellulatae.*

Holotypus: Along creek in paramo of Cerro de la Muerte, 3200 m, Prov. San Jose, L.D. Gomez & R. Moran 18357 (CR). Isotypus: ILLS. Paratypes: MO, ILLS, R. Moran 2370, ILLS.

Etymology: *paramicola*= inhabiting the paramo. Of the group of *Athyrium filix-foemina* Roth, it resembles *A. asplenoides* (Michx.) Eaton in the characters of the indusium. The subflexuose rachis suggests affinity to *A. palmense* (Christ) Lellinger and its pink stipes and rachises and subopposite pinnae bring it close to *A. skinneri* (Baker) Diels but both *palmense* and *skinneri* have creeping, non-proliferous rhizomes and more divided fronds.

Grammitis bufonis sp. nov. *Planta epiphyta, rhizomate repens, 3 mm crassum, paleis clathratis, angustissime lanceolatis, acuminatis, 3.5 mm longis, ferrugineis, dense vestito; stipitibus fasciculatis, numerosis, proximis, 4-8.5 cm longis, 1-1.5 mm crassis, glabris. Lamina integra, glabra, carnosula, plana sed in siccitate pauciter repanda, 15-19(20) cm longa, 11-13 mm lata, marginata, margo fusce-nigrescens, apicem acuta, basim angustata longissime decurrens modo alae, basibus stipitibus attingens. Venae steriles simplices, 7-8 per cm, fertiles supra basim furcatae, venulae soriferae curvae sori 3-4 mm longi, elongati, costam obliqui.*

Holotypus: Epiphyte. Cerro Sapo, up to 3600 ft (1085 m), Prov. de Darien, Panama, B. Hammel 1171 (MO). Paratypus: C. Sapo, Hammel 1180 (CR).

Closely related to *G. bryophyla* (Maxon) Seymour, but differs from it in the distant fronds, these of greater dimensions. With this combination of characters it is easily distinguished from the other known species of *Grammitastrum*. Etymology: *bufonis* = of the frog, C. Sapo.

Thelypteris (*Amauropelta*, *Apelta*) *pseudoaspidioides* sp. nov. Herba rheophila, rhizomate erecto, apicem paleis membranaceis, cinnamomeis, panduratis, subclathratis (cellulis anisodiametricis), sparse setosis (setae 1-cellulatae, rigidae), amplio-ellipticis pauciter oblecto; stipitibus fasciculatis, 5-12 cm longis, brunneo-nitentes, paleis rhizomatis basalibus. Lamina lanceolata, 4-6 cm lata, \pm 25 cm longa, pinnata, pinnae 9-12-jugis inferiores petiolulatae (\pm 0.5-1 mm), apicem pinnatisecta (9-10 seg. + segmentum apicali, caudatum)! pinnae 2.3-2.8(3) cm longae, 4-6 mm latae, integrae, oblongae, apices obtusae, basibus inaequalibus, superiore elongata, excavata, inferiore rotundata, reducta; venis 10-12-jugis, 1-furcatis, margines attingentes, marginibus membranosis (callosis), pauci pilosis. Sori exindusiati, parvi, elliptici, submarginali, sporangiis glabris. Sporae brunneae, (35)42.95 X (24.8)27.69 μ m.

Holotypus: Bajo La Hondura, Prov. San Jose, 1000-1200 m, L.D. Gomez 520 (CR). Paratypi: Rio Chitaria, Cartago, 565 m, R. Moran 2227 a & b, (ILLS); Rio Claro, La Hondura, 1000 m Burger & Stolze 4888 (F; CR).

The new species superficially resembles *T. aspidioides* (Willd) Tryon which, like all other species in sect. *Uncinella*, has uncinulate hairs totally lacking in our plant. Etymology: *pseudoaspidioides* = the false [*Thelypteris*] *aspidioides*.

Known also from Panama: Valle de Anton, 1000 m, H. Kennedy et al 3180 (MO, CR); headwaters of Rio Coleveborita above Sta. Fe, 500 m, Ve-raguas, Sytsma & Anderson 4757 (MO); 1 km E of Quebrada Amarillo in La Mesa, Cocle, 2600 ft, Sytsma & D'Arcy 3587 (MO, CR); La Fortuna, Chiriqui river, 1025 m, Chiriqui, Hammel 2291 (MO, CR).

Thelypteris (*Amauropelta*) *mombachensis* sp. nov. Herba rhizomate erecto, 2-3 cm crasso, paleaceum, paleis membranosis, fusco-ferrugineis, deltoideo-lanceolatis, sparse setosis, apicem vestito. Lamina 30-45 cm longa, vix 17 cm lata, pinnata, pinnis (13)15-17-jugis basim abrupte reductis deflexisque; stipes avellaneus, 5-10 cm longus, paleis rhizomatis et pilis (0.1 mm) praesertim retroadpressis; rachis utroque simile pilosis; pinnae alternae, 7.5-12 cm longae, 1.7-2.8 cm latae, latitudine ca. 0.8 incisae (pinnulae 13-22, 4-5 mm latae), non falcata, apicem rotundato-obtusa; costae costulaeque utroque pilosae, pagina inter venas utrimque glabra, eglandulosa; venis 6-7-jugis, infimae margine supra sinus attingens; sori mediali, oblongi, exindusiati; sporangium glabrum.

Holotypus: Upper slopes of Volcan Mombacho, ca. 15 km S of Granada,

in cloud forest, 1100 m, Granada, Nicaragua, T. Croat 39122 (CR). *Isotypus*: Croat 39122, MO. *Paratypes*: summit of Mombacho, Atwood et al. 6726 (MO); Plan de las Flores, Mombacho, 1200 m, Atwood 294 (MO). Other materials: Atwood 298, A304a (MO, US).

Related to *Thelypteris linkiana* (Presl) Tryon, from which it differs by its basal veins reaching the margins above the sinus and the lack of hamate hairs, and to *T. atrovirens* (C.Ch.) Reed whose laminar surfaces are hamate pilose below and have numerous, adpressed hairs above.

Sciaphila (Sc., *Hermaphroditantha*) *paradoxa* sp. nov.

Plantae floribus femineis et etiam floribus hermaphroditis ferentes. Flores hermaphroditis: stamina 1-5(6), carpella numerosa; antheris bithecis; Polygynia subsectio nova pertinentes.

Herba mycorrhizophila, saprophyta, glaberrima, rubra (siccando purpureo-caerulea), radicibus filiformibus, strictis, glabris, jugis oppositis vel verticillatis. Caulis rigidus, simplex vel ramosus, strictus, 1-1.2 mm crassus, obscuriter angulatus, cum racemo 30-35 cm altus, pauce squamatus, squamis (bracteae) distantibus caules amplexentes, lanceolatis, acutis, concavulis ascendentibus, 4-5 mm longis, 1.5-2 mm latis, sursum in bracteae decrescentibus. Racemus erectus, 40-70-floratus; flores hermaphroditi etiam feminei; pedicellati (pedicellus arcuato-reflexus, 4.5-8 mm longus), bracteatus, bracteae lanceolatae 2-2.2 mm longae, 0.7-0.8 mm amplae, membranosae, apicem rotundato-incrassatae. Perianthum utriusque sexus plerumque 6-partitum, tepala aequalia, carnosa, deltoidea, 2-2.5 mm longa, 0.6-0.8 mm lata, intus minutissime papillata extus glabrata, apicem copiosissime barbata, pilis vermiformibus, 1-3-cellulatis, 0.9-1.2 mm longis, 12-15µm crassis. Flores hermaphroditi 1-6-andri; antherae sessiles, bithecae; grana laeves, 3-nucleata, ±30µm, quasi sphaerica, sulcoidata. Carpella numerosa, ±20. Flores feminei ovariis numerosis (±20) instructi. Carpella obovata, papilloso-bullata, 0.8-1.2 mm alta; styli supra basim ovariorum inserti, clavati, picem versus pilosi, pilis 1-cellulatis, rigidulis; ovaria parum superantes. Carpella matura apice gibboso-cristata. Fructus indehiscens, fuscus, seminibus 1, oblatiis, 1 mm longis, atrofuscis longitudinaliter prominenter costatis, transverse celluloso-reticulatis.

Holotypus: Inmediaciones de Laguna Bonilla, Provincia de Limon, 400-500 m; en bosque premontano muy humedo. L.D.Gomez & L. Glicenstein 18466, CR. *Paratypes*: MO, US, K, BM, F.

The closest relative of *S. paradoxa* is *S. picta* Miers, which belongs in subsection *Oligandra*. Unlike any other known species in the genus *S. paradoxa* has all-female flowers and peculiarly, a fluctuating number of stamens in the hermaphroditic flowers, its anthers resemble apothecia and some of them seem to be unithecate. This combination of characters would justify the erection of a new genus of *Triuridaceae* but in spite of the ample material at hand that shall await a better knowledge of the family in general.

MISCELLANEOUS NOTES ON NEOTROPICAL FLORA, XIV

Jose Cuatrecasas
Department of Botany, Smithsonian Institution
Washington, D. C. 20560

CECROPIA UTCUBAMBANA Cuatr. sp. nov.

Arbor 10 m alta. Rami terminales robusti circa 3-4 cm diam ochraceo-virides nodis 12-25 mm longis laevibus puberulis pilis teneris minutis vel minutissimis acutis albis vel hyalinis et pilis crassis brunnescentibus sparsis vel copiosis muniti. Stipula terminalis viridi-ochracea 8-10 cm longa extus minute puberula pilis crassiusculis ferrugineis minutis sparsis, intus sericea pilis rectis rigidulis acutis albo-hyalinis 1-2 mm longis prostratis copiose vestita.

Folia chartacea peltata utrinque viridia. Lamina usque ad 62 cm longa 60 cm lata 9-10-costata usque medium vel ad $2/3$ lobata, lobis radiatis ellipticis vel elliptico-obovatis ad apicem attenuatis obtusisque ad basim plus minusve angustatis; lobi maximi ab insertionem petioli usque ad apicem 32-37 cm longi parte libera 13-16 cm lati, minimi 11-19 cm longi 6-9 cm lati, parte centrali integra inter lobos majores 10-16 cm, inter minores 6 cm radii; margo leviter sinuata papillosa et breviter piloso-araneosa; adaxiale in vivo viridissima, asperrima pilis brevibus rectis acutissimis hyalinis fragilibus basi conica calcarea indurata persistenti, costa nervisque secundariis filiformibus notatis; abaxiale in juvenilibus nervis rubescentibus in adultis omnino pallide viridis, aspectu glabra sed nervis venulisque minutissimis pilis papillosis crassiusculis copiose praedita; costae robustae argute striatae nervi secundarii graciliter promigentes semiteretes microscopicè granulati, proximales angulo 55° distales angulo 30° ascendentes plerumque 1.5-2 cm inter se distantes vel in lobis infimis 1-1.5 cm tantum separati; venae minores subparallelae prominulae 3-4 mm distantes sed interdum venula intermedia magis tenuis adsunt; areolae planae vel leviter convexae virides minutissime sparseque papillosae. Petiolus robustus 34-53 cm longus argute striatus aspectu glaber sed pilis minutissimis acutis vel obtusis papilliformibus sparsis munitis; pulvinus basalis eminens ferrugineus velutinus pilis patulis rectis acutis uniseriati-pluricellularibus 0.7-1 mm longis congestissime dispositis, interdum corpusculis albidis ellipsoideis 0.2-0.3 mm longis inter tomentum presentibus. In foliis valde juvenilibus (15-20 cm diam) lamina tenella membranacea adaxiale scabra pilis conicis acutissimis minutis copiose munita, abaxiale glabra nervis venisque sparse vel copiose minuteque papilloso-pilosis excepta.

Inflorescentiae femineae 4(-5)-amentiferae longissime pedunculatae pendulaeque, jam maturitate in speciminibus. Pedunculus 36-50 cm longus 4 mm diametro striatus sparse minuteque puberulus

viridi-ochraceus. Spathae in specimine absentes. Amenta sessilia teretia 28-32 cm longa 9-10 mm diam, aliquando magis juvenila 20-30 cm longa 7 mm crassa aspectu cinerea sed lana alba inter flores adpressa conspicua, tactu sublaevia (non aspera). Perianthium florum femineum scariosum hyalinum fragile apice calloso-incrassato obtuso vel leviter angulato ochraceo viridulo minute papilloso et dilute arachnoideo, sursum prope marginem copiose albo-lanatum. Stigmata rubescentia. Semina ellipsoidea moderate compressa 1.8-2.1 x 1-1.2 mm, interdum adpresse ovoidea 1.3 x 1.7 mm, brunnescentia nitida laevia vel partiale sublaevia, conspicue ochroleuco-marginata.

Typus: Peru, prov. Bongará, dept. Amazonas: 4 km below Campamento Ingenio, along Rio Utcubamba, 1250 m alt. Tree to 10 m; leaves 10-lobed; veins and petioles of younger leaves reddish; fruit 4-5 fingered. Ants cultivate aphids in cells of stems; these collected in 1 oz. jar. 28 Jan 1964, P.C. Hutchinson & J.K. Wright 3844. Holotype, UC; isotype, US.

Cecropia utcubambana is closely related to few other species also with chartaceous, totally green leaves, subglabrous below and scabrous above, like *C. putumayonis*, *C. setico*, *C. burriada*, and *C. dabeibana*, some of them having also pendulous spadices. The new species differs from them by having the following features together: very long inflorescence peduncles, very long sessile spikes, 9-10 main nerves and leaf-lobes, the lobes broadly elliptic or obovate-elliptic and the petioles and peduncles scabrous. It is expected that male specimens which unfortunately are lacking at present will produce additional characters when collected in the future.

CARRAMBOA TACHIRENSIS (Aristeguieta) Cuatr. comb. nov.

Espeletia tachirensis Aristeguieta, Compositae in Flora Venezuela 10(1):427. 1964.

Espeletiopsis tachirensis (Aristeguieta) Cuatr. Phytologia 35(1):56. 1976.

Recent study of the growth form in the field by the author of this and the following species has resulted in their transfer to Carramboa.

CARRAMBOA WURDACKII (Ruiz-Terán & López-Figueiras) Cuatr. comb. nov.

Espeletia wurdackii Ruiz-Terán & López-Figueiras, Rev. Fac. Farm. Univ. Andes, Mérida 17:1. 1976.

Libanothamnus wurdackii (Ruiz-T. & López-F.) Cuatr. Phytologia 35(1):51. 1976.

ESPELETIA MIRADORENSIS (Cuatr.) Cuatr. Nov. status

Espeletia grandiflora var. miradorensis Cuatr. Phytologia 32:324. 1975.

EPELETIA CAYETANA (Cuatr.) Cuatr. nov. status.

Epeletia grandiflora var. cayetana Cuatr. Phytologia 32:323.1975.

- - - - -

STUDIES IN NEOTROPICAL SENECTIONEAE III.
NEW TAXA IN SENECIO, PENTACALIA AND GYNOXYS

Jose Cuatrecasas
Department of Botany, Smithsonian Institution
Washington, D. C. 20560

SENECIO HANSWEBERI Cuatr. sp. nov.

Herba rhizomatosa caule lignoso argute nodoso prostrato semi-subterraneo repente plagiotropo cum radicis numerosis subteneris carnosulis geotropis et ramulis brevibus rosulas paucifoliatas terminales gerentibus.

Folia rosularia 9-20 cm longa 4-8 mm lata sessilia. Lamina carnosulo-coriacea rigida oblanceolato-linearis subite acutata marginibus argute revolutis aspectu integerrima basin versus paulo attenuata, adaxiale in adultis viridissima laevis glabra tantum linea mediali plus minusve impressa, abaxiale costa elevata sicut marginibus retortis viridibus glabrisque ceterum plana alba densissima adpresseque lanata infra indumentum enervia superficie laevi; basis laminae in vaginam ampliata. Vagina membranacea viridula glabra parallele nervata circa 3 cm longa basi ad 8-9 mm lata valde amplectenti.

Caulis florifer terminalis bene foliatus robustiusculus fistulosus striatus rigidus erectisque ad 30 cm longus purpurascens subglaber tantum pilis albis tenuissimis longissimis araneosis dilutis denique deciduis, copiose foliis alternis rosularibus similibus sed sursum gradation brevioribus, medialis ad 12 cm longis superne 6-4 cm x 3-2 mm omnibus ad basim ampliatis vaginantibus amplectentibusque. Pars distalis fertilis 5-10 cm longa corymbiforme ramosa, ramis alternis proximalibus 8-10 cm longis vel longioribus 2-3 capituliferis sursum gradatim brevioribus plerumque monocephalis, pedunculis 1-2 cm longis vel longioribus striatis rigidis erectisque. Bracteae subtendentes inferiores folia suprema similes 30 x 2-3 mm, lanceolatae sursum minores lineares acutae in pedunculis copiosae, supremae 10-8 x 1-0.6 mm subimbricatae in calyculum gradatim mutantes.

Capitula erecta radiata cylindraceo-campanulata 14-18 mm alta 9-12 mm diametro, circulo ligularum 25-30 mm diam, 137-143 flores ferentia. Calyculus 8-10 bracteolis lineari-lanceolatis acutis 6-9 x 1.0-1.6 mm, herbaceis crassiusculis viridibus sursum plus minusve purpureis glabris (vel marginibus parvis pilis 0.1-0.2 mm)

pluriseriatis imbricatis interioribus involucrium fere attingentibus exterioribus cum bracteolis pedunculi numerosis gradatim subimbricatis. Involucrium cylindraceo-campanulatum circa 11 mm altum, 21 phyllariis aequilongis subuniseriatis crasse herbaceis firmulis 9-10 mm longis lineari-lanceolatis acutis glabris apice minute ciliato excepto inferne viridibus sursum purpureis, alternatim exterioribus, 1.2-1.5 mm latis interioribus anguste scarioso-marginatis 2-2.3 mm latis. Receptaculum planum 5-6 mm diam nudum glabrum leviter alveolatum.

Flores radii feminei ligulati 13-14 in capitulo. Corolla lutea 15-18 mm longa, tubo angusto 4-5 mm longo praecipue sursum sparse vel copiose piloso pilis 0.2-0.3 mm crassis sed debilis hyalinis pluricellularibus flexuosis obtusissimis usque ad clavatis; lamina 10-13 x 3.5-5 mm elliptica apice obtusa minuteque 3-denticulata, 5-7 nervis plerumque aurantiacis valde notatis utrinque glabra. Stylus 6-7 mm ramis strictis 2.5-2.7 mm apice convexo dense papilloso papillis obtusis, lineis stigmaticis adaxiali-marginalibus crassiusculis fere conniventibus, basi bulbosis cellulis subquadratis pluristratosus.

Flores disci hermaphroditi 123-129 in capitulo. Corolla lutea 7-9 mm longa glabra, tubo 4-5 mm longo, limbo tubuloso sursum gradatim leviterque dilatato 5 dentibus triangularibus crassiuscule marginatis apice paulo papilloso 0.6-0.8 mm altis. Antherae 2.5 mm longae basi obtuse auriculatae appendice apicali oblongo-elliptica obtusa 0.3-0.35 mm longa. Cellulae endotheciales in parietis lateralibus noduliferis. Collum crassum 0.6 mm longum quam filamento crassius deorsum lageniforme incrassatum. Stylus 8-8.5 mm longus basi semi-bulboso-dilatatus, ramis 1.5 mm strictis apice subtruncato convexo, lineis stigmaticis adaxiali-marginalibus crassiusculis subconniventibus.

Achaenia oblonga leviter compressa circa 2.5 mm longa 0.8 mm lata apice obtusa truncata cum annulo pappifero incrassato, costis 10 minute substrigosis pilis gemini-cellulatis, crassiusculis obtusiusculis 0.1-0.15 mm rectis antrorso-patentibus. Pappus albus 6-8 mm longus pilis biseriatis strictissimis minute strigulosis jam caducis.

Typus: Costa Rica: Chirripó-Massiv, Valle de Las Lagunas am Ostüfer der Laguna Grande in einer Moos-Felsschotter-Gesellschaft, 3400 m 18 Mar 1971, Heinrich Kuhbier 0439; holotypus US. Pico Sureste, Chirripó massif 3500-3700 m, leaves glabrous above white below, rays gold and yellow, 9 Dec 1966, A.S. Weston 3607; paratype, US. Near main ridge, Chirripó massif, wet NE slope of Pico de Uran, above lakes, 5 Feb 1981; A.S. Weston 12313 (US). Cerro Chirripó, treeless paramo SW around summit 10,000-12,600 ft, occasional, terrestrial along watercourses, Aug 1967, Evans, Lellinger & Bowers 155 (US).

Senecio hansweberi is closely related to the Andean species of sect. Culcitoides Cuatr. which group should be redefined including glabrous species with leaves with revolute margins (e.g. *S. supremus*, *S. timidus*); the new species can be included in subsection *Radiati* Cuatr., with *S. comosus* Schultz B. ex Wdd. of Peru as the closest species. *S. hansweberi* differs from the Peruvian species by being smaller, and having smaller, narrower and stiffer leaves, erect

flowering branches and pedicels, smaller bracts and bracteoles multibracteolate pedicels and pubescent achenes with geminate trichomes. It is vegetatively very close also to *S. culcitioides* from Ecuador and *S. summus* from Colombia, but both of these are larger plants with larger leaves, having discoid capitula and glabrous achenes.

S. hansweberi adds to the long list of Costa Rican paramo endemics. The species is named for Dr. Hans Weber who first mentioned this *Senecio* as an element of the paramo flora of Costa Rica and published an excellent photograph of it in its natural habitat with the following legend "Abb. 70. Noch nicht bestimmter *Senecio* in den Felsspalten des Chirripo grande" (Weber 1958). Dr. Hans Weber is to be commended for his excellent work on the ecology and phytogeography of the Costa Rican paramos and his first-hand comparative study with the Andean paramos. Most important is his contribution to the paramo plant life in his fundamental work on the anatomy and morphology of the *Espeletia* growth form (caulirosula) with an especially meticulous histogenetic study of its apical meristem.

SENECIO KUHBIERI Cuatr. sp. nov.

Herba rosulifera copiose stolonifera. Stolones dense adpresseque lanati rosulam terminalem et caulem floriferum terminalem effe-rentes. Folia rosularia petiolata. Lamina carnosulo-coriacea rigidula anguste lanceolata vel elliptico-lanceolata apice acute attenuata basi plus minusve gradatim cuneata, 4-16 cm longa 0.8-1.7 cm lata, margine minute mucronato-denticulata et anguste revoluta, adaxiale juvenilis tenuiter adpresseque albo-lanuginea adulta glabra viridis vel plus minusve brunnescens nitida leviter bullata depresso nervata costa profunde impressa nervis secundariis 10-12 utroque latere curvato-ascendentibus impressis tertiis obliquis minus notatis, abaxiale albo-lanata, costa prominentissima cum velo sericeo adpresso tecta, superficie indumento albo-lanato denso adpresso munito, infra vestimentum nervis secundariis bene prominentibus, nervis minoribus prominulis laxe reticulatis. Petiolus 5-10 cm longus argute striatus adpresse lanatus vel lanuginosus in foliis vetustis plus minusve glabratis. Vagina 1-2 longa basi ad 10 mm lata amplexans, adaxiale glabra extus adpre-ssissime lanato-sericea.

Rami floriferi terminales ad 50 cm alti vel ultra, tenues sed rigidi striati fistulosi plus minusve purpuracentes et dilute adpresse lanuginosi denique plus minusve glabrati, moderate foliati, foliis sparsis alternis parvis inferioribus prope basim petiolatis rosularis similibus, ceteris sessilibus lanceolatis acutis basi dilatato-cordatis amplexantibus, proximalis 9 x 0.8 cm sursum gradatim brevioribus bracteiformibus supremis infra inflorescentiam 3-2 cm x 3-2 mm, omnibus textura foliorum basium similibus. Inflorescentia corymbosa 4-10 capitulis, ramis et pedunculis teneris striatis gracilibus ascendenti-erectis purpurascentibus et arachnoideo-lanugineis ultimis 20-30 mm longis ad modum peduncu-lorum, bracteolis alternis numerosis lanceolatis vel subulatis

10-5 mm longis.

Capitula radiata tereti-campanulata circa 13 mm alta 9-10 mm lata 66-80 flores ferentia circulo ligularum 30 mm diametro. Calyculus 7-9 bracteolis 4-5 x 0.6-0.7 mm herbaceis viridibus lineari-subulatis acutis glabris sed apice minute ciliato, interioribus tantum 1/3 vel 1/2 involucrium attingentibus. Involucrium cylindricum circa 10 mm altum 7-9 mm diam, phyllariis 21 herbaceis viridibus lineari lanceolatis costa crassiuscula praecipue ad basim 9.5-10 mm longis, externis angustis 1 mm latis internis scarioso-marginatis circa 1.8 mm latis, dorso glabris apice penicillato-ciliato pilis papillosis elongatis crassiusculis obtusis supremis hyalinis ad 0.4 mm longis. Receptaculum planum 4 mm diam nudum glabrum leviter alveolatum.

Flores radii feminei ligulati 12-14 in capitulo. Corolla lutea 18-21 mm longa, tubo angusto 5 mm longo prope apicem paulo dilatato abaxiale parvis pilis crassis biseriatim pluricellulatis flexuosis 0.2-0.4 mm longis; lamina elliptico-oblonga 13-18 x 3-3.5 mm obtusa 3 dentibus minutis obtusis apice papillosis plerumque 5 nervis bene conspicuis, utrinque glabra adaxiale leviter mamillato-papillata. Stylus 7 mm longus, basi bulbosa cellulis quadratis pluristratis, ramis strictis 1.5-1.8 mm apice truncato-convexo papilloso lineis stigmaticis adaxiali-marginalibus crassiusculis fere conniventibus. Ovarium 2.8 mm longum oblongum laeve glabrum. Pappus 7-8 mm longus albus pilis strigulosis biseriatis.

Flores disci hermaphroditi 54-66 in capitulo. Corolla lutea 8.5-9 mm longa glabra, tubulo 4 mm longo, limbo tubuloso sursum paulo dilatato, dentibus 5 triangularibus 1 mm altis margine incrassato apice breviter papillosis linea mediale aurantiaca plus minusve conspicua. Antherae 2.5 mm longae basi obtusiuscule auriculatae, appendice oblonga 0.35 mm longa. Cellulae endothecales oblongae parietibus lateralibus noduliferis. Grana pollinica 0.035 mm. Collum 0.3-0.5 mm longum cellulis quadratis quam filamento crassius basim plus minusve dilatatum Stylus basi semibulbosus ramis 1.6-2 mm longis apice convexo papillato papillis obtusis proximalibus longioribus coroniformibus lineis stigmaticis late crassiusculis approximatis. Ovaria 2.8-3 mm leviter compressa glabra laevia vel sublaevia, apice obtuso annulo crasso pappifero et sicut pappus illa radii similia.

Typus: Costa Rica: Cordillera de Talamanca, Chirripó massif, Tal des Rio Talari in Hoehe der Felsbarre, auf Bloekken zu beiden Seiten des Wasserfalles, 3400 m, 15 Mar 1971, Henrich Kuhbier 0381; holotypus, US. On boulder ridge between Cerro Chirripó and Cerro Nudo, heads radiate yellow without fragrance, occasional, 9 Feb 1981, A.S. Weston 12351; paratype US.

Senecio kuhbieri is another endemic of Costa Rican paramos and a unique species in the genus. It differs from *S. hansweberi* by its weaker, stoloniferous habit with few-leaved rosettes, long-petiolate leaves, rather thin somewhat in zigzag becoming glabrate flowering stems, slender pedicels, fewer number of flowers, longer ray-corollas, and glabrous ovaries. It also may be placed in the subsect. Radiati of Sect. Culcitioides, being easily distinguished

mostly by the above mentioned features from the other species of the subsection.

PENTACALIA GUADALUPE subsp. *CAUCANA* Cuatr. ssp. nov.

Arbuscula circa 2.5 m alta. Rami ramuli ramusculique dense ferrugineo-tomentosi, trichomatibus ramentaceis polymorphis plerumque triangularibus basi late ampliatis sursum acuminatissimis acutis longitudinaliter argute lineatis circa 3 mm longis flexuosis intricatisque.

Folia alterna rigide coriacea petiolata. Lamina 3-5 x 1.6-2.2 cm elliptica basi obtusissima apice breviter attenuata mucronulata, margine visu integra sed valde revoluta sparsis dentibus minutis callosis subtus occultis; adaxiale atroviridis, in sicco brunnescens, nervato-rugosa nitida, juvenilis puberulenta pilis minutis flexuosis copiosis subadpressis adulta glabrescens, costa nervisque secundariis impressis minoribus plus minusve depressis; abaxiale dense ferrugineo-lanata pilis valde tenuibus crispis intricatis tecta et ad costam additionalibus ramentis intermixis; infra indumentum nervis secundariis 6-7 utroque latere valde prominentibus robustisque subpatentibus, nervis minoribus laxe reticulatis parum prominulis. Petiolus robustus 8-14 mm longus ramentosus.

Inflorescentiae terminales corymbiforme paniculatae folia paulo excedentes, 5-12 cm latae, densae floribundae, ramis ramusculisque, dense ferruginoso-tomentosis indumento ramentaceo. Bractae proximales foliaceae sed minimae, mediales et distales breves lineari-lanceolatae 8-5 x 1-0.6 mm. Pedicelli breves vel brevissimi capitulis subsessilibus 0.5-5 mm longi ramentis angustioribus densiuscule tecti.

Capitula discoidea cylindracea 10-11 mm alta circa 6 mm diametro. Involucrum 8-8.5 mm altum purpureo-brunnescens (in sicco). Phyllaria 8 subuniseriata crasse herbacea carnosula rigidula, exteriora oblonga apice acute attenuata 6.5-7 x 1.5-1.6 mm, interiora oblongo-elliptica acutata margine late scarioso eroso-ciliolato 6.5-7 x 2.6-3 mm, omnia nitida glabra vel juvenilia praecipue inferne sparsis pilis longis tenuibus flexuosisque, ad apicem abaxiale obtusi-papillosa apice ciliato, dorso obtuse 4-5-nervata. Receptaculum planum 2.2 mm diam leviter alveolatum nudum sed aliquando 1-2 squamis minutis 0.5 mm longis. Calyculum involucri valde brevius 6-8 bracteolis lineari-lanceolatis 2-3-seriatis 3-5 x 1-1.3 mm dilute ferruginoso lanugineis.

Flores omnes hermaphroditi, 19-22(-24) in capitulo. Corolla lutea tubulosa 7 mm glabra, tubo angustiori 2.2-2.5 mm longo, limbo tubulari-campanulato sursum gradatim leviterque dilatato, lobis oblongo-triangularibus 1.2-1.3 mm longis marginibus crassioribus, apice subcucullato-incrassato praecipue adaxiale conspicue papilloso. Antherae 2.2 mm longae basi caudatae appendice apicali oblongo-elliptica 0.3 mm longa, cellulis endothecialibus in parietis lateralibus seriati-noduliferis. Collum lageniformi-

dilatatum 0.5 mm longum cellulis subquadratis conspicuissimis. Stylus 7.5 mm, ramis 2 mm longis arcuatis adaxiale lineis duobus stigmaticis late incrassatis fere conniventibus, apice attenuato papilloso-pilosulo papillis obtusis ad 0.1 mm, adaxiale dense brevi-papilloso, basi oblongo-bulbosus 0.5 mm longitudinis. Ovaria 1.7-2 mm longa elliptico-oblonga 10-tenui-nervata 5-angulato-costata glabra, apice obtusa cum annulo pappifero incrassato. Pappus albus 5-6 mm longus setis biseriatis strictissimis inaequilongis minute strigosus acutisque.

Typus: Colombia, Cauca: Macizo Colombiano, Páramo de Las Papas, colinas SE de la Laguna La Magdalena, vert. rio Magdalena, 3350-3450 m, arbusto 2.5 m, hojas verdes negruscas brillantes haz ferruginosos envés, cabezuellas amarillentas, 12 Sept 1958, Idrobo, Pinto & Bischler 3250; holotypus COL.

Subspecies caucana differs from ssp. guadalupe by the elliptic shape and apparently entire margin of the leaves, by the more abundant and dense indument which covers branchlets, inflorescences and the abaxial side of the leaves, and by the naked receptacles. In S. guadalupe the leaf-lamina is deeply crenate-dentate and usually truncate at base, the indument does not cover the shining costa beneath and the branches are becoming glabrate. In addition in ssp. guadalupe the ramenta are narrower, longer and firmer and the receptacles are fimbriate.

PENTACALIA FREEMANII (Britt. & Greenm.) Cuatr. comb. nov.

Senecio freemanii Britton & Greenman. Ann. Mo. Bot. Gard. 8:92, pl. 2. 1921. Type: Britton, Hazen & Mendelson 1292, Trinidad.

PENTACALIA DESIDERABILIS (Velloso) Cuatr. comb. nov.

Senecio desiderabilis Velloso, Flora Fluminensis, Icones VIII t. 108, 1827, (1831). Archivos do Museu Nacional Rio Jan. 5:334.1881.

Senecio ellipticus DeCand. Prodr. 6:420. 1837. Cabrera, El Genero Senecio en Brasil, etc. Arquivos Jard. Bot. Rio Jan. 15:198. 1957.

LASIOCEPHALUS MOJANDENSIS (Hieron.) Cuatr. comb. nov.

Senecio mojandensis Hieron. ex. Sodiro Engl. Bot. Jahrb. 29:67.1900.

Senecio cayambensis Cuatr. Fedd. Repert. 55:135. 1953.

GYNOXYS RIMACHIANA Cuatr. sp. nov.

Arbuscula ad 10 m alta. Folia alterna chartacea rigidiuscula in sicco tabacina longe petiolata. Lamina 14-19 x 7-10.5 cm ovata ad apicem attenuata subacutata basi obtusa vel subrotundata margine plana laevis sinuata dentibus callosis minutissimis repandis munita; adaxiale sublaevis, costa signata et nervis lateralibus

parum notatis plus minusve stellato-pilosis, reliqua superficie tantum sparsis vel raris pilis minutis stellatis albis vel ochroleucis praedita; abaxiale costa prominenti striolata, nervis secundariis circa 7 utroque latere angustis sed prominentibus patulis et curvato-ascendentibus prope marginem arcuato-anastomosantibus, nervis tertiis transversis minus prominentibus teneris cum venulis minoribus in reticulum laxum anastomosatis; costa et nervis principalibus dense reliqua superficie copiose pilosa pilis stellatis parvis vel minutis sessilibus vel breviter pediculatis radiis subuniformibus vel inaequalibus, crassiusculis vel teneris, plerumque intricatis. Petiolus 4.5-6 cm longus argute striatus densiuscule stellato-pilosus, basi leviter ampliatus.

Inflorescentiae terminales floribundae sub-corymbiforme paniculatae circa 20 cm longa et ampla (in specimine). Axis robustus. Rami inferiores 22-15 cm longi dimidia parte superiori corymbosoramosa, sicut ramuli teneri sed rigidi erecti vel ascendentes striolati, copiose stellato-pilosi. Pedicelli graciles erecti vel inclinati 4-12 mm longi pilosiusculi.

Capitula radiata cylindracea circa 7-8 mm longa. Involucrum campanulatum viride 4-5.5 mm altum quam floribus brevius, 8 phyllariis 4.4-4.8 mm longis, exterioribus 1 mm latis oblongis apice paulo attenuatis crassiusculis deorsum magis incrassatis, interioribus 1.6-1.8 mm latis membranaceis sed linea media carnosa crassaque et circa basim crassiori, elliptico-oblongis, omnibus ad marginem circa apicem eroso-ciliatis reliquis glabris. Calyculus 2-3 bracteis linearibus acutis 1-2.5 (-3) mm longis 0.3 mm latis.

Flores radii feminei ligulati tantum duo in capitulo. Corolla lutea 10 mm longa glaberrima, tubo 3.6-4 mm longo angusto, lamina elliptico-oblonga 1.7-2 mm lata 4-5 nervata apice subite angustata minute tridentata apicibus dentium minute crasseque papillois, adaxiale minute mamillato-papillosa. Stylus circa 6 mm longus, ramis 2 mm recurvatis adaxiale duobus lineis stigmaticis crassis parallele conniventibus apicibus conicis papilloso-coronatis et longe caudatis, pilis lanceolatis ad circa 0.5 mm. Ovarium 1.8-2 mm longum, oblongum plus minusve conspicue 5-angulatum apice annulare dilatatum. Pappus circiter 4 mm longus stramineus setis biseriatis inaequalibus 1-4(-4.5) mm longis acutis scabris basi coalitis; annulus extus minute obtuseque papillosus.

Flores disci hermaphroditi 7-9 plerumque 8 in capitulo. Corolla lutea tubulosa 6.5-7 mm longa glabra tubulo 2.8-3.2 mm crassiusculo limbo tubuloso 3.5-3.8 mm longo argute lobato lobis linearibus 1.5-1.8 mm longis tenuiter uninervatis, apicibus minute crasseque papillois. Antherae 3 mm longis basi breviter acuteque auriculatae appendicibus apicalibus ovato-oblongis 0.7 mm longis, endothecio-cellulis subquadrangularibus parvis nodulis in transversis parietibus; collum cylindraceum vix incrassatum. Stylus ramis elongatis maturitate recurvis adaxiale lineis stigmaticis duobus, crassis parallele conniventibus, apice conico copiosis papillis ad 0.4 mm longis coronato centro caudato pilis lanceolatis erectis ad 0.7 mm. Ovarium 1.8-2 mm longum oblongum 5-angulatum. Pappus et achaenia illa radii similia.

Typus: Peru, Huánuco, Dto. Chinchao, highway Tingo Maria-Huánuco,

El Mirador near Carpath, 2600-2700 m, rocky clay soil, tree 10 m, corolla yellow, 21 Mar 1980, Manuel Rimachi 4908; holotype, US.

G. rimachiana is a well defined species that fits into the section *Praegynoxys* Cuatr., characterized by having the floral and habit features of *Gynoxys*, except the alternate disposition of the leaves. The stellate hairs, characteristic of this species, are found also in some other unrelated *Gynoxys* and *Pentacalia* species being an uncommon feature. Nevertheless the stellate trichomes seems to be not sufficiently basic to support a generic or subgeneric rank for any group at the time being.

References

- Weber, Hans. 1956. Histogenetische Untersuchungen am Sprossscheitel von *Espeletia* mit einem Ueberblick ueber das Scheitewachstum ueberhaupt. Abb. Akad. Wiss. Lit. Mainz. 1956:566-618.
- Weber, Hans. 1958. Die Paramos von Costa Rica und ihre pflanzen-geographische Verkettung mit den Hochanden Suedamerikas. Akad. Wiss. Lit. Mainz, Jahrg. 1958. No. 3.

- - - - -

MISCELLANEOUS NOTES ON NEOTROPICAL FLORA, XV. NEW TAXA IN THE ASTEREEAE.

Jose Cuatrecasas
Department of Botany, Smithsonian Institution
Washington, D. C. 20560

BACCHARIS KINGII Cuatr. sp. nov.

Frutex usque ad 1-1.5 m altus profuse ramosus ramis griseis striatis divaricatis, ramulis ascendentibus argute striatis glabris glanduloso-viscosis. Folia lineri-lanceolata sessilia utrinque angustata acutaeque vulgo 10-22 mm longa 0.6-1.8 mm lata conspicuissime trinervata copiosissime glanduloso-punctata.

Capitula in pseudopaniculis cymosis brevibus terminalibus, ramulis alternis subpatentibus cymas 3-2 capitulis ferentibus vel monocephalis. Pedunculi teneri sed rigidi striolati glabri ad 1 cm longi vel capitulis subsesilibus tribus vel duobus glomeratis ad terminationes ramulorum. Bractee subtendentes lineares folia similes sed breviores 7-2 x 1-0.2 mm.

Capitula mascula per anthesin corollis involucrum excedentibus subglobosa 6-6.5 mm alta 4-5 mm lata, 22-40 flores ferentia Involucrum ante et per anthesin in vivo phyllariis adpresse imbricatis ellipsoideum basi cuneata 5 x 3 mm, in sicco phyllariis leviter squarrosis conico-campanulatum 5 x 4-4.5 mm. Phyllaria gradatim imbricata 7-8 seriata; interiora fertilia vix exserta 3-2.3 x 0.5 mm lineari-lanceolata acutiuscula scariosa straminea abaxiale linea

media brunnescenti marginibus sursum eroso ciliolatis apice parvis pilis brevibus flexuosis; alia phyllaria sterilia conspicuissime pluri-imbricata chartacea rigida incurva vel concava straminea sursum dorsale brunneo-maculata margine scarioso subhyalino minute eroso aliquando apice ciliato, subinteriora 3-2.8 x 1.3 mm late oblonga obtusa, medialis ovalia circa 2 x 1.4 mm obtusissima, proximalia obtusa 1.8-1.5 x 1.7-1 mm, omnia abaxiale copiose glanduloso-punctata. Receptaculum conicum 1.3 mm diam muricatum tantum margine paleaceum reliquum nudum. Paleae scariosae lineares vel lineari-lanceolatae 2-2.5 x 0.2-0.3 mm. Corolla mascula eburnea 3.8-4 mm longa tubo 1.5-1.8 mm longo, limbo infundibuliformi profunde lobato lobis linearibus acutis 1.3-1.4 x 0.3-0.35 mm margine incrassatis glabris sed ad apicem adaxiale papillosis per anthesin recurvatis; parte media corollae sparsis pilis subclavatis glandulosis 0.04-0.07 mm longis antrorsis cellulis biseriatis. Antherae 1.5 mm longae basi auriculatae appendice oblonga attenuata subacuta hyalina 0.3 mm longa. Cellulae endotheciales oblongae nodulis parietalibus. Collum breve crassitudine filamentum aequans cellulis quadrangularibus. Grana pollinica tricolporata echinulata 0.020-0.025 mm. Stylus 4 mm longus apice bifurcatus ramis lanceolatis 0.5 mm abaxiale dense papilloso-pilosis papillis obtusis ad 0.1 mm longis. Nectarium cylindricum crassum apice cupulatum basim styli includens 0.3 mm altum. Ovarium rudimentum obsoletum sed basi cum annulo calloso cellulis quadratis pluriseriatis et parvis glandulis subglobosis munitum. Pappus circa 5 mm longus, setis uniseriatis strigosis distale dilatatis, basi incrassatis in annulo crassiusculo coalitis, interdum parvis setis subbiseriatis.

Capitula feminea cylindracea circa 5-5.5 mm longa 2.5 mm crassa 70-140 flores ferentia. Involucrum 4 mm altum phyllariis 6-7-seriatis. Phyllaria interiora 3-3.5 x 0.7-1 mm papyracea incurva oblonga obtusa vel subobtusata margine scariosa minute erosa ad apicem interdum ciliata, phyllaria medialis elliptica 2.5 x 1.2 mm, 2 x 1.3-1.4 mm, infima ovata 2.6-2.2 x 1.5-1 mm, omnia dorso maculata et profuse glanduloso-punctata. Receptaculum planum 1.3 mm latum muricatum et paleaceum. Paleae scariosae rigidae semiamplexantes 3-3.5 x 0.3 mm, subulatae acutae ad apicem lacerato-ciliatae, caducae. Corolla feminea capillari 1.5-2 mm longa apice inaequaliter obliquo vel eroso et pilosulo margine abaxiale magis elevato, tubo praecipue sursum copiosis glandulis crassis cylindraceis vel clavatis e cellulis biseriatis, 0.05-0.1 mm longis antrorsis subadpressis 0.05-0.1 mm longis. Stylus 3 mm longus corollam excedens ramulis oblongo-ellipticis 0.5 mm longis. Ovarium oblongum circa 1 mm longum strictum copiosis pilisantrorsis rigidis acutis vel bicuspidatis cellulari-geminatis 0.1-0.15 mm longis. Achaenia 1.4 mm oblonga 3 nervis plusminusve conspicuis copiose strigosa pilis geminis acutis vel bicuspidatis, basi angustata cum pediculo calloso crasso annulari cellulis quadratis 8-10 seriatis instructo. Pappus albidus circa 2.5 mm longus setis strictis rigidis strigosis apice acutis non dilatatis, basi crassiusculis in annulo coalitis.

Typus: Peru, Ancash, along highway #3 ca 6 Km N of Carhuaz, 2200 m alt. Shrub up to 1 m, flowers cream-colored, 9, 10 Jan 1982

R.M.King & G.L.Collins 9028; holotype, US. Lima, Prov. Huarochirí, arriba de Surco, cerca Matucana, falda cerro 2000-2100 m, arbusto 0.30-0.60 m, ♀, 21 May 1949 R.Ferreyra 6053; paratype, US. Other collections from USNH examined: López Miranda 0386 (♂), Macbride & Featherstone (♂), Goodspeed 33108, López Miranda 3223 (♀), George Barclay 2286 (♀), Ferreira 14588 (♀, ♂).

Baccharis kingii belongs to section Pseudobaccharis (Cabrera) Cuatr. being well distinguished from other members of the section by its small, irregularly paniculate inflorescences, shape and size of leaves and shape and composition of the capitula.

BACCHARIS Sect. PSEUDOBACCHARIS (Cabrera) Cuatr. sect. nov.

Pseudobaccharis Cabrera in part, Not. Mus. La Plata Bot. IX, 46: 246. 1944.

Frutices erecti foliis trinervis brevibus angustis paniculis terminalibus evolutis vel reductis et subracemiformibus, receptaculis femineis paleaceis. Typus sectionis Pseudobaccharis spartioides Hook & Arn. Cabrera, Heterothalamus spartioides Hook & Arn. Other species: Baccharis boliviensis (Wedd.) Cabr., B.tenella Hook & Arn., B.retamoides Philip. and other species not yet well known due to lacking female specimens.

BACCHARIS sect. PSILA (Philippi) Cuatr. sect. nov.

Psila Phil. Ann.Mus.Nac.Chile 7:36. 1891.

Fruticuli prostrati caespitosi vel pulvinati, foliis sessilibus linearibus parvis uninerviis vel enerviis. Capitula mascula solitaria terminalia vel pauca. Capitula feminea receptaculo paleaceo. Typus sectionis Psila caespitosa Phil.=Heterothalamus acaulis Wedd. ex Fr.=Baccharis acaulis (Wedd.) Cabrera. Other species: probably B.davidsonii Cuatr.

LAGENIFERA Cassini

Lagenifera is a genus of 15 recognized species in a recent monograph (Cabrera, 1966), distributed in Southeast Asia, Malasia, Australia, New Zealand, Central America, North Andes and southern South America. Only 3 species were before known from tropical America making the section Pseudomyriactis Cabrera: L.panamensis Blake, from Chiriqui in Panama, L.andina Badillo from Venezuelan Andes and L.cuchumatanica Beaman & Jong from Guatemala. The explorations of the paramos of Costa Rica by A.S.Weston in 1969, who found four species of the genus in the region, indicate that the Costa Rican paramos are a center of speciation and radiation, adding two new species to Lagenifera plus a third, L.andina, only known heretofore from the Andes of Venezuela. It may be speculated that the Andean species was originated in the Costa Rican massif and

that this is the center of differentiation and radiation of the section *Pseudomyriactis*. From this massif the group may have radiated northwards to Guatemala and southwards to Chiriqui, Panama, and to the North Andes in Venezuela. *Lagenifera* was validly published by Cassini in Bull. Sciences on Dec., 1816, and was used by him until March, 1818 when he changed the name into *Lagenophora* which since has been largely and exclusively used. Nevertheless, according to the Int. Code of Nomenclature (Art. 73) the original spelling must prevail. Other already well known significant Compositae genera of this paramo complex are the monotypic *Ilisia* Blake and *Westoniella* Cuatr. represented by five endemic species. In this paper, three new species of *Lagenifera*, two of them from Costa Rica and one from Panama, all collected by A.S. Weston, are described.

LAGENIFERA WESTONII Cuatr. sp. nov.

Herba breviter rhizomatica probabiliter stolonifera foliis rosulatis. Rhizoma breve geotropum 3-4 mm diam nodulosum radices copiosas fasciculatas crassiusculas ad 15 cm longas valde radicelliferas efferens radicellis tenuissimis longis divaricatis.

Folia rosulata herbacea viridia 7-11 cm longa petiolata et vaginata. Lamina ovata vel elliptica 4.5-5 x 2.5 cm, pinnatisecta, segmentis 4-5 utroque latere alternis ellipticis vel obovatis obtusis vel obtusissimis pinnatifidis vel lobatis, 15-10 mm longis, deorsum decrescentibus proximalibus simplicibus obovatis vel oblongis basi angustatis 8-4 mm longis; marginibus crassiuscule leviterque revolutis. Petiolus angustus rigidus 3-5 cm longus. Vagina robusta purpurea valde amplexans 1.5-2 cm longa. Folia tota densiuscule hirsuta pilis pluricellularibus uniseriatis acutis albis patulis, 0.5-1 mm longis, basi calloso-tuberculata in lamina notata, in vaginis pilis tantum ad margines valde copiosis longioribusque (1.5 mm).

Rami 1-8 axillares, basi prostrati ceterum ascendentes, 15-25 cm longi inferne robustiusculi obtuse sulcati superne angustiores striati viridi-purpurascentes vel purpurei, densiusculi-hirsuti, copiose foliati, tantum sursum 3-4 ramosi. Folia ramulorum sessilia vel proximalia pseudopetiolata, 6-1 cm longa, 1.5-0.4 cm lata sursum gradatim decrescentia, obovato-oblonga vel oblonga apice obtusa basi late amplexentia proximalia pinnatifidia medialia profunde lobata distalia lobato-dentata, lobis plerumque obovatis vel ellipticis; omnia profuse hirsutula. Ramuli 2-4, teneri patentes parce bracteati, bracteis 6-3 x 2-1 mm oblongis obtusis integris vel paulo dentatis, copiose hirsutuli, 1-2 capituliferi, pedicellis gracilibus ad 25 mm longis breviter hirsutis, pilis uniseriati-cellularis acutissimis patentibus rectis vel parce flexuosis 0.2-0.4 mm et glandulis crassiusculis teretibus biseriati-cellularis 0.1 mm longis.

Capitula semiglobosa circa 8 mm diametentia, laterale compressa 9 mm lata, circulo ligularum ad 12 mm diametro, 53-58 flores ferentia (in capitulo minimo 31 floribus). Involucrum cupulatum

basi subturbinatum phyllariis triseriatis membranaceo-herbaceis viridibus uninervis, glabris marginibus ciliatis exceptis ciliis 0.05-0.2 mm, exterioribus oblongis apice subite acutato 3.2-3.8 x 0.8-1.2 mm interioribus fertilibus 3.3-3.8 x 0.7 mm, magis tenuis subscariosis marginibus hyalinis lacerato-ciliatis. Receptaculum planum 2 mm diam glabrum areolatum areolis convexis.

Flores radii feminei circa 41-44. Corolla ligulata alba vel plusminusve purpurea, tubo crassiusculo 0.2 mm longo dense granulato-glanduloso, lamina elliptica obtusa minute 3-dentata, 2-2.3 x 0.7-0.8 mm ad basim abaxiale parvis glandulis crassis teretibus ad 0.1 mm longis cellulis biseriatis. Stylus 1 mm ramis lanceolatis 0.2 mm longis Achaenia immatura 2.5 mm longa 2-costato-marginata laterale compressa glaberrima obovata basim versus cuneato-atenuata basi acutata carpophoro calloso crasso pluri-stratoso, ad apicem subite angustata et in rostrum annularem 0.3-0.4 mm longum densissime granulato-glandulosum producta.

Flores disci hermaphroditi circa 12-14. Corolla 2 mm longa, tubo 0.5 mm glandulis biseriati-cellularis teretibus 0.05-0.08 mm longis circulatim dispositis, limbo turbinato-campanulato 5 lobis 0.8-0.9 mm longis triangularibus acutis apicibus papillosis. Antherae circa 0.7 mm basi rotundatae appendicibus apicalibus anguste oblongis acutis 0.15-0.2 mm longis. Cellulae endotheciales in parietis lateralibus noduliferis. Grana pollinica echinata 0.025 mm. Stylus 2.8 mm ramis 0.8 mm, lanceolatis abaxiale dense papilloso-pilosis. Achaenia immatura 2.3 mm longa obovato-oblonga basin attenuata acuta 2-costato-marginata compressa, basi annulum callosum cellulis pluri-stratosi, apice rotundato non rostrato tantum parvis glandulis biseriati-cellularis ad marginem munito.

TYPUS: Costa Rica, Cerro Jaboncillo 3200 m alt, rays numerous, white to dark red, 14 Aug 1969, Arthur S. Weston 5867; holotypus US. Another collection, Costa Rica: Valle de los Lagos, Chirripó massif, 3500 m, 7 Sept 1969, A.S. Weston 6064 (US).

Lagenifera westonii is essentially distinct from the other species of Section *Pseudomyriactis* Cabr. to which it belongs, for its deeply lobed leaf laminae, being the basal ones pinnatisect, and also for the lack of a beak in the ovary of the disk flowers. It furthermore, differs from *L. panamensis* Bl. by its habit, the lower number of flowers per capitulum and the oblong shape of the phyllaries, from *L. andina* by the abaxially glabrous phyllaries and longer tubular part of the ray corollas, from *L. cuchumatana*, it differs in addition by its polycephalous branches, higher number of ray flowers and more abundant indument.

LAGENIFERA SAKIRANA Cuatr. sp. nov.

Herba humilis breviter rhizomatica foliis rosulatis, probabiliter stolonifera. Rhizoma rectum 2.5 cm longum circa 3 mm crassum geotropum radices tenues efferens.

Folia rosularia pauca herbacea firmula bene petiolata basi vaginantia; petiolus 10-12 mm longus basi in vaginam amplexentem producta; lamina ovata vel ovalis utrinque obtusa margine incre-

ssato dentato-lobato lobis obtusis vel subobtusis, penninervis nervis 3 utroque latere ascendentibus, adaxiale atroviridis abaxiale pallidior, utrinque copiose hirsuta pilis acutis basi callosotuberculata patentibus vulgo 0.5 mm longis in petiolo ad 1.2 mm longis.

Ramis floriferi monocephali axillares 4 in specimine 10-25 cm longi, erecti vel plerumque juxta basim patente arcuati ceterum erecti, teneres sed rigidi striolati purpurascentes parce puberuli pilis tenuibus acutis leviter flexuosis ad 0.5(-1) mm sparsis vel sparsissimis, aspectu subscaposi aphylli sed 3-8 bracteis parvis alternis sessilibus spathulatis vel anguste oblongis distale breviter dentatis vel integris basi amplexantibus proximalibus 15 x 5 mm sursum decrescentibus superne 3 x 0.5 mm, distale graciliter longe nudi.

Capitula semiglobosa 7-9 mm lata circulo ligularum 10 mm diam 40 flores ferentia. Involucrum cupulatum. Phyllaria 2-seriata oblonga 3.5-4 x 0.8 mm, herbacea viridia margine scarioso-hyalino eroso ciliato nervo medio unico parce ramoso, parca interiora angustiora.

Flores radii ligulati 25. Corolla rosea tubo 0.3-0.35 mm longo glabro vel parcis glandulis, lamina lineari-oblonga 3-3.2 x 0.7-0.8 mm apice 2-3-dentata. Stylus crassiusculus 1.7-2 mm ramis 0.35-0.40 mm lanceolatis glabris. Achaenia 2.3 x 1 mm obovata basin versus attenuata apice rotundata cum rostello 0.2 mm alto annulare dense granulato glanduloso munita, ovulata, 2-costato-marginata laterale compressa glabra, basi acutata callosa.

Flores disci 15. Corolla 2.5-2.8 mm longa glabra tubo 1 mm longo viridi-albo, limbo campanulato lobis purpurascens 0.6-0.7 mm triangularibus marginibus callosis-incrassatis apice parce papilloso. Antherae 0.6 mm longae basi-rotundatae appendicibus apicalibus anguste oblongis 0.15 mm longis. Ovaria 1.6-1.8 x 0.8 mm ovulata 2-costato marginata complanata obovato-oblonga glabra apice obtusa non-rostrata basi angustata callosaque.

Typus: Costa Rica, Cerro Sakira 3300 m; basal leaves dark green with pustulate hairs on upper surface; rays numerous pink; disk flowers purple brown lobes, tubes and throats pale green, 14 Aug 1969 Arthur S. Weston 5834; holotypus, US.

Lagenifera sakirana (sect. *Pseudomyriactis* Cabrera) differs from the other Andean and Central American species by the subscapose flowering branches which are slender and only bracteate (not leafy) in their lower half or two third parts. From *L. panamensis* and *L. andina* it differs in addition by the shape of the leaves and indument, by the monocephalous subscares and fewer flowers on each head. From the more closely related *L. cuchumatana*, it differs by the hirsutulous adaxial side of the leaves, the glabrous abaxial side of the phyllaries, the longer tube and lamina of the ray corollas, the larger disk corollas and by the absence of an annular glandulose apical projection of the disk ovaries.

LAGENIFERA MINUSCULA Cuatr. sp. nov.

Herba pumila rhizomatosa foliis subrosulatis ramulis florigeris subscaposis. Rhizoma horizontale 1.5-2.5 mm crassum nodulosum plus minusve ramosum radices carnosulas subtenues geotropas ad 10 cm longas efferens, ramulis rosulas paulifoliosas et scapos monocephalos gerentibus.

Folia rosularia petiolata plerumque glabra crassiuscule herbacea adaxiale atroviridia abaxiale praecipue ad margines et costam plus minusve purpurascentia. Lamina elliptica vel oblongo-elliptica vel subspathulata apice obtusa vel subobtusa basi attenuata cuneata 7-10 x 2.5-4 mm; marginibus crenato-dentatis, dentibus plerumque 3 utroque latere subacutis antrorsis indurato-callosis, costa abaxiale prominula, nervis laterales 2-3 ascendentibus parum conspicuis. Petiolus robustiusculus adaxiale sulcatus abaxiale teres et purpurascens, 8-10 mm longus. Vagina circa 5 mm longa valde amplexans viridi-purpurascens, glabra vel interdum marginibus parvis pilis.

Rami floriferi pauci, tantum unus in specimine circa 3.5 cm longus tenuis basi arcuatus reliquo erectus purpureus subglaber tantum sparsissimis pilis 0.1-0.3 mm longis tenuibus subflexuosis obsoletis, foliis parvis bracteiformibus proximalibus 2-3 oblongis sessilibus leviter 2-3 dentatis 8 mm longis 1 mm latis, sursum gradatim minoribus parvis 5-3 x 0.2-0.1 mm linearibus, distale nudus. Capitulum unicum semiglobosum 4-5 mm latum circulo ligularum ad 9 mm diam, 27 flores ferens. Phyllaria 3 seriata exteriora oblonga subobtusa vel subite acutata herbacea purpurascentia circa 2.5 x 0.5 mm margine anguste hyalino lacerato-ciliatoque medialia circa 3 x 0.5-0.6 mm, pallide viridia et purpurea nervio medio tantum notato, interiora subscariosa pallida angustiora 2.8-3 x 0.3 mm.

Flores radii 17 ligulati. Corolla alba 2.8-3.2 mm longa, tubo 0.4 mm longo glabro interdum parcissimis glandulis, lamina lineari-oblonga circa 0.6 mm lata apice obtusa 2-3 denticulata raro edentata. Stylus 1.3-1.5 mm longus ramis 0.2-0.4 mm acutatis glabris. Ovaria juvenilia obovato-oblonga vel oblonga vel elliptica obtusa 1.2-1.5 x 0.6 mm complanata apice rostro annulari dense glandulifero glandulis crassis oblongis cellulari-biseriatis, basi paulo angustata pluristrato-callosa.

Flores disci 10. Corolla lutea 2-2.2 mm longa glabra infundibuliforme campanulata lobis 0.6 mm longis oblongo-triangularibus acutiusculis apice papillosis. Antherae 0.9-1 mm longae saccis basi rotundatis, appendicibus 0.15-0.18 mm anguste ovato-oblongis. Cellulae endotheciales nodulis in parietis lateralibus. Collum filamentum isodiametricum 0.18 mm longum cellulis subquadratis. Stylus ramis lanceolatis exsertis 0.6 mm longis abaxiale dense longeque papilloso-pilosis. Ovaria 2.1 mm longa elliptico-oblonga glabra apice erostrato non glandulato.

TYPUS: Panama, prov. Chiriquí: Cerro Fábrega (between Cerro Bine and North end of Cerro Fábrega ridge, near the Costa Rican frontier, south of summit, 3150-3335 m, rare; rays 16 white, disc yellow. April 7-8, 1976. Arthur S. Weston 10154; holotypus, MO.

Besides the small size of the whole plant, Lagenaria minuscula differs from the other species of sect. Pseudomyriactis by being glabrous or almost glabrous, by the monocephalous subscapose flowering branches with few small bracts in their distal part, by the small heads, 4-5 mm broad, with a total of 27 flowers with 16-17 white ray corollas, by the obconical campanulate disk corollas and by the erostrate glandular apex of the disk ovaries. The repent, branching, rather thin rhizome, probably tending to form caespitose tufts, may be another distinctive trait, but it is difficult to perceive with the scanty material at hand.

WESTONIELLA LANUGINOSA Cuatr. sp. nov.

Suffrutex erectus circa 30 cm altus sursum ramosus, caule inferne simplex exfoliato cortice griseo sublaevi sed plus minusve fissurato, glabrato cicatricibus foliorum delapsorum 2-4 mm distantibus. Rami erecti fere fastigiati dense foliati, basibus foliorum subimbricatis, internodiis 1-2 mm longis copiose glandulosis glandulis globoso-pediculatis et parce hirtulis.

Folia sessilia alterna. Lamina crassiuscule herbacea 7-12 x 1.8-2.2 mm, oblonga apice acuta basi ampliata subauriculato-amplexicaulis, apiculum et 1-3 paribus dentium minutis callosis acutis antrorsis; sed marginibus plerumque convolutis folia habitu linearia 1-1.5 mm lata; adaxiale tantum costa impressa plusminusve notata superficie cinerea vel albida tota densiuscule glandulata glandulis minutis globosis sessilibus et majoribus breviter pediculatis, plus pilis brevibus patulis acutis sparsis et pilis tenuissimis 0.01-0.015 mm diam. longissimisque albis intricatissime arachnoideo-lanatis, abaxiale costa valde prominenti venis minoribus laxe reticulatis prominulis plerumque parum notatis, superficie etiam glandulifera et albolanuginosa.

Capitula 3-5 corymbiforme disposita ad extremos ramulorum dense foliatorum. Pedicelli 3-10 mm longi albo-lanati. Bracteis supremis ramusculorum vel bracteolis 9-6 x 1.2-1 mm linearibus albo-lanuginosis.

Capitula 9 mm diametro 7-8 mm alta. Involucrum cupulatum 5-6 mm altum. Phyllaria circa 4-seriata subaequalia, interiora 5-5.4 mm longa inferne 0.7-1 mm lata, lineari-lanceolata acutissima, subherbacea anguste hyalino-marginata dorso purpurea glabra distale lanuginea, exteriora leviter breviora dense albo-lanata pilis crassiusculis uniseriatim multicellularibus 3 mm longis 0.05 mm crassis patentibus sed flexuosissimis intricatisque interdum ad basin parvis glandulis marginalibus. Infra involucrum bracteolis cum phyllariis similibus etiam spisse piloso-lanatis plurimis ad modum calyculum dispositis. Receptaculum planum minute alveolatum 4 mm diametro.

Flores radii feminei 102 in capitulo. Corolla 4-4.3 mm longa anguste tubulosa inferne capillaris sursum vix ampliata parte media glandulis cellulari-biseriatim 0.5-0.1 mm longis, oblongis vel subclavatis sparsis vel copiosis, apice contracta adaxiale 0.25-0.3 mm fissa vel oblique truncata abaxiale plerumque 3 dentibus obtusis

interdum lobo laterali plus minusve conspicuo. Stylus strictus inclusus basi breviter bulbosus apice duobus ramis 0.5 mm lineari-lanceolatis teneris marginalibus minute stigmatico-papillosis. Achaenia 1.8-2 x 0.7-0.9 mm obovato-elliptica argute bicostata leviter compressa uno latere uninervo apice obtusissima basi subite acutata distale parvis pilis geminatim bicellulatis rigidis acutis circa 0.15 mm erecto-patentibus. Pappus circa 4-4.5 mm longus albus pilis uniseriatis strigosis sursum haud dilatatis.

Flores disci pseudohermaphroditi 40 in capitulo. Corolla tubulosa violacea 4.8-5 mm longa parte media sparsis vel copiosis glandulis biseriatim cellulatis oblongis vel subclavatis 0.05-0.1 mm longis, limbo anguste infundibularis violaceo lobis brevibus triangulatis 0.4-0.5 mm altis apice papillosulis dorso sursum parvis glandulis oblongis vel clavatis 0.05-0.07 mm ornatis. Antherae 1.5 mm longae basi obtusae appendice oblonga attenuata 0.3-0.35 mm longa. Grana pollinica echinata 0.025-0.030 mm diametentia. Collum cylindricum circa 0.5 mm longum cellulis quadratis vel oblongo-rectangulatis. Stylus ramis 0.6-0.7 mm lanceolatis extus dense papilloso-pilosis papillis circa 0.05 mm obtusissimis erecto-patentibus. Ovaria 1.2-1.3 mm longa anguste oblonga 3-4 nervata sterilia tantum uno latere parce pilosula pilis bicellularibus rectis rigidis acutis 0.1 mm longis. Pappus pilis uniseriatis strigosis 4.5-5 mm longis sursum haud vel parum ampliatus.

TYPUS: Panama prov. Chiriquí: Between Cerro Bine and North end of Cerro Fábrega, near the Costa Rican frontier, 3150-3335 m alt; rare, only found on Cerro Fábrega ridge. Ray florets tubular, 7-8 Apr 1979, Arthur S. Weston 10169; holotypus, MO.

Westoniella lanuginosa is related to the two species (*W. kohkemperi* and *W. eriocephala*) of the first couple of the key (Cuatrecasas 1977), and may be included in it with some modification. Differs from those two species by the shorter size and shape of the leaves (7-12 x 1.8-2 mm) and by the indument of the blades, which are adaxially copiously glandular and rather densely white-lanugineous. This species is the first record of the genus outside of Costa Rica meaning an extension of the known area of *Westoniella* to the northern mountains of Panama.

DIPLOSTEPHIUM SANTAMARTAE Cuatr. sp. nov.

Arbor ad 5 m alta ramis terminalibus subteretibus cicatricosis internodiis 5-10 mm longis dense adpressequ sublanatis pilis brevibus crassiusculis flexuosis valde intricatis et adpressis flavecenti-albidis.

Folia alterna petiolata. Lamina coriacea rigida ovata vel oblongo-ovata basi obtuse cuneata sursum leviter attenuata subacutata apice mucronato, 7-10.5 cm longa 3.2-4.5 cm lata, margine revoluta integra vel minutis dentibus mucronulatis obsoletis, adaxiale viridis in adulta glabra nervis obsoletis, abaxiale albido-ochroleuca minutis pilis flexuosis intricatissimis valde adpressis omnino tecta, costa crassa elevata nervis secundariis 17-20 utroque latere prominentibus patentisque nervulis tertiis prominulis laxae

reticulatis. Petiolus 2-3 cm longis fere robustus adaxiale canaliculatus abaxiale marginibusque dense adpressissimeque minutilanus, basi leviter ampliata vaginantia.

Inflorescentiae paniculatae axillari-subterminales foliis adultis supremis brevioribus, axi ramisque dense adpressissimeque lanatis ochroleucis leviter striatis. Pedicelli in specimine ad 7 mm longi adpresse ochroleuco-lanati. Bracteolae subtendentes minutae virides subulatae acutae ad 1 mm longae.

Capitula campanulata basi obtusa 7.2-9 mm alta 4.5-5 mm diametientia radiata. Involucrum circa 5.5 mm altum, purpureo-rubescens. Phyllaria gradatim imbricata 5-seriata chartacea rigidula, interiora 4.7-4.2 x 0.6-1.3 mm ovali-lanceolata acuta vel acutissima, marginibus minute serrulatis sursum ciliolatis, dorso distale dense vel copiose glandulata et parvis pilis subflexuosis, medialis ovato-oblonga usque ovata 4-3 x 1.5-2 mm subacutata vel subobtusa, proximalia 3-2 x 2-1.2 mm rigida concava ovato-triangulari subacuta. Receptaculum conicum alveolatum marginibus alveolorum crassiusculis obtuse dentatis, glabrum.

Flores radii feminei 8-10 in capitulo. Corolla ligulata 5.5-6 mm longa, tubo 4-4.2 mm parte media et distale copiosis pilis crassis 2-seriatis-cellulatis glandulosis subpatentibus ad 0.05 mm longis; lamina 2.5 mm longa elliptica vel oblongo-elliptica 0.5-0.7 mm lata basi adaxiale acute aperta, apice obtusa breviter 2-3-dentata, dorsale dense conspicueque brevipilosa praesertim ad dimidiam inferiorem partem sed etiam sursum pilis crassis biseriatis-cellulatis glandulosis, adaxiale mamillato-papilloso subvelutina. Stylus 4-5 mm longis ramis 0.6-0.7 mm oblongis obtusiusculis apice attenuatis subacutis marginibus adaxiale late stigmatosis. Ovaria fertilia 1.8 mm longa oblonga plerumque tantum 3 nervis conspicuis dense antrorso-hispida pilis geminis-cellulatis 1-2-cuspidatis 0.5 mm longis. Pappus rubescens circa 4 mm longus pilis scabrosis biseriatis interioribus sursum dilatatis exterioribus brevioribus 1-2 mm longis acutis.

Flores disci pseudohermaphroditi 31-35 in capitulo. Corolla 4-4.2 mm longa praecipue in parte media pilosula pilis crassis clavatis ad 0.1 mm longis, tubo angusto circa 1.5 mm longo, limbo inferne angusto sursum parce ampliato apice parum constricto, dentibus triangularibus 0.6 mm longis nervis marginibus incrassatis et praecipue adaxiale dense papilloso, extus copiose glandulifero glandulis globosis vel obovatis crassis. Antherae 1.2-1.3 mm longae base obtusiuscule auriculatae appendice apicali 2.5-3 mm longa oblongo-elliptica obtusa. Cellulae endotheciales oblongae nodulis ad parietes laterales seriatae. Collum cylindricum filamento parum crassius 0.45-0.50 mm longum cellulis seriatis quadratis vel sursum oblongo-quadratis. Stylus ramis 0.7-0.8 mm longis complanatis lineari-lanceolatis acutis abaxiale marginibusque dense papilloso-hirtis papillis obtusis antrorsis ad 0.08 mm longis. Ovaria anguste oblonga trinervata sterilia dense longeque hispida pilis antrorsis geminatis-cellulatis acutis. Pappus illis radii similis.

TYPUS: Colombia, Magdalena: Sierra Nevada de Santa Marta, "Transecto del Rio Buritaca" 3000 m alt, arbolito 3 m, brácteas e

involucro de color vino tinto, hojas haz verdosas envés amarillo pálido, Aug. 1977, O. Rangel & A.M.Cleef 928; holotypus COL. Circa Laguna de Rio Frio on the way from San Pedro de la Sierra, via Pico José Hilario, 3450 m, tree 5 m, disk flowers dark red, ray flowers yellow undersurface of leaves white pubescent, 31 Jul J.H.Kirkbride & R.Forero 18108; paratype, US.

Diplostephium santamartae belongs to Series Denticulata Blake and is closely related to *D.grantii* Cuatr. from the Sierra de Perijá. The Santa Marta species may be easily distinguished by its ovate, broader and obtuse or subobtuse leaves at base, by the purplish red involucre with wider phyllaries, by the ligules densely glandular abaxially, the disc tubular corollas with short triangular teeth only 0.6 mm long, and the reddish pappus. In contrast, *D.grantii* has leaf-laminas oblong-elliptic acutely cuneate at base, stramineous greenish involucre, ligules non glandular, disk corollas with long linear lobes 1.8-2 mm long and pale yellow pappuses.

DIPLOSTEPHIUM SERRATIFOLIUM Cuatr. sp. nov.

Frutex ramulis terminalibus foliatis teretibus dense adpresse-que cinereo-lanatis. Folia alterna coriacea petiolata. Lamina 1.5 cm longa 0.7-1.1 cm lata elliptica apice obtusiuscula basi cuneata margine dentato-serrulata dentibus 1-2 mm distantibus antrorsis argute callosa-mucronatis, adaxiale viridis rugulosa praecipue juvenilis tenuissime lanuginea, abaxiale conferte adpresse-que cinereo-lanata costa prominenti conspicuissima nervis secundariis 8-9 utroque latere erecto-ascendentibus prominulis, reticulo venulorum cum indumento velato. Petiolus 5-8 mm longus adaxiale planus subtus teres, dense cinereo-lanatus. Capitula longe pedunculata in paniculis terminalibus laxis oligocephalis disposita, ramis 4-5, alternis erecto-ascendentibus dense adpresse-que cinereo-lanatis. Bracteae subtendentes proximales foliaceae reliquae sursum breves bracteosae lanceolatae vel lineares 6-3 mm longis. Pedunculi erecti teretes 1.5-2.5 cm longi adpresse tomentoso-lanati.

Capitula longiradiata circa 12 mm alta 8-9 mm crassa circulo ligularum 30-40 mm diametro circa 80 flores ferentia. Involucrum cupulato-campanulatum 8-8.5 mm altum pallide stramineo-viride, phyllariis 5-6-seriatis imbricatisque, interioribus 8-8.5 mm longis x 0.9-0.8 mm latis, lineari-lanceolatis acutissimis margine scarioso-transtrucidis eroso-ciliolatis apice barbato-ciliato, mediis similibus gradatim brevioribus infimis lanceolatis circa 3 mm longis 0.8-0.9 mm latis. Receptaculum planum sed ad centrum leviter protrudum, 3 mm diam minute alveolatum glabrum marginibus alveolorum crassiusculis obtusis nudis.

Flores radii circa 32. Corolla ligulata fortasse purpurascens 28-30 cm longa, tubulo 3-4 mm longo angusto sparsis pilis crassiusculis glanduloso-capitatis biseriati-pluricellularibus ad 0.2 mm longis, lamina lineari tenuissima infirmissima in statu flaccido flexuosissima 2-2.2 mm lata 4-5-nervata abaxiale inferne parvis pilis glanduliferis adaxiale minute denseque mamillato-papillosa. Stylus 6 mm longus basi bulbosa ramis 1.4-1.7 mm longis complanatis

sublanceolatis marginibus incrassatis stigmatico-papillosis. Ovarium 2 mm longum oblongo-ellipticum costato-marginatum fertile copiose hispidum et densiuscule glandulosum, setis gemini-cellularis patenti-erectis acutis bicuspidatis rigidulis 0.2-0.5 mm longis, glandulis globosis pediculatis biseriati-cellularis 0.04-0.06 mm longis. Pappus 4.5 mm longus albido-stramineus setis scabridis interioribus sursus leviter ampliatus exterioribus numerosis squamiformibus 0.3-0.5 mm longis.

Flores disci hermaphroditi circa 57 in capitulo. Corolla 6.5-7 mm longa, tubulo 2.2-2.5 mm longo media parte distali copiosis pilis crassiusculis glanduloso-capitatis biseriati-cellularis 0.1-0.3 mm longis antrorsis, limbo tubuloso ad apicem purpurei inferne sparsis pilis glanduliferis, lobis dentiformibus triangularibus 0.7-0.8 mm longis marginibus incrassatis papillosisque abaxiale sursum parvis glandulis obovoideis biseriati-cellularis subsessilibus vel breviter pediculatis. Antherae 2.6-2.7 mm longae basi obtusiusculae appendice 0.7-0.8 mm longa anguste oblonga subacuta. Collum 0.40-0.45 mm longum cum filamento crassius cellulis breviter rectangularibus longitudinaliter seriatis. Stylus 7-7.5 mm longus basi bulbosus ramis 1.5 mm complanatis linearibus sursum attenuatis marginibus stigmatoso-papillosis, parte distali lanceolata extus margineque papilloso-pilosa. Ovarium obovato oblongum costato-marginatum plerumque fertile ad costas setis gemini-cellularis erecto-patentibus rigidis acute bicuspidatis, faciebus densiuscule glanduliferis basim densius barbatum pilis gemini-cellularis rigidis 0.1-0.4 mm. Pappus 5-5.5 mm longus setis interioribus parce dilatatis acutis, exterioribus squamiformibus copiosis 0.4-0.8 mm longis.

TYPUS: Peru, Cajamarca, Contumaza, circa Contumaza, 2700 m alt, Jun 1960, Asencio Alza s.n.; holotypus, LP.

D.serratifolium is a rare species of *Diplostephium* easily distinguished by its serrate rather small leaves. Its relationships must be sought among species of the series *Rupestris* Bl. in the Peruvian and Bolivian area, like *D. haenkei* (DC.) Wedd. *D. pulchrum* Blake, etc. From all it differs by its relatively long-petiolated elliptic rugose, sharply serrulate leaves, by the basically stramineous involucre, pale pappuses and details of flowers. The slenderness of the long ray corollas seen in wetted material is very pronounced becoming extremely soft, pliable, and hyaline. Other parts of the flowers (disk corollas, styles, anthers, filaments) are likewise slender, much thinner than in any other species. The branches of the styles in the disk flowers are flattened with marginal stigmatic papillas except for the acute distal part which is papillose-hispidulous; in *D. haenkei* they have also stigmatic lines, but they are shorter than in *D. serratifolium*. This species differs also from *D. haenkei* and *D. pulchrum* by its costate-marginate, copiously glandular ovaries.

References

- Cabrera, A.L. 1966. The genus *Lagenophora* (Compositae). *Blumea* 14(2): 285-307.
Cuatrecasas, J. 1977. *Westoniella* a new genus of the *Astereae* from the Costa Rican paramos. *Phytologia* 35(6):471-487.

NOTES ON NEW AND NOTEWORTHY PLANTS. CLXI

Harold N. Moldenke

LANTANA CANESCENS f. *PARVIFOLIA* Mold., f. nov.

Haec forma a forma typica speciei foliis sub anthesin parvioribus laminis 1.5--2 cm. longis 6--10 mm. latis recedit.

This form differs from the typical form of the species in having its apparently mature leaves, at time of anthesis, much smaller, only 1.5--2 cm. long and 6--10 mm. wide.

The type of the form was collected by D. C. Daly, R. Callejas, M. G. da Silva, E. L. Taylor, C. Rosario, and M. R. dos Santos (no. 1113) at the edge of campinarana at approximately 30--35 km. from Tucuruí (25 km. on old BR 422, then 5--10 km. east on the old railroad bed), Para, Brazil, at approximately 3°58' S., 49°37' W., on October 14, 1981, and is deposited in the Lundell Herbarium at the University of Texas, Austin.

LANTANA DWYERIANA Mold., sp. nov.

Frutex, ramis gracilibus griseis perbrachiatis dense puberulis in senectute glabris, internodiis abbreviatis, foliorum cicatricibus elevatis, foliis decussato-oppositis numerosis uniforme parvis breviter petiolatis, laminis anguste lanceolatis 2--2.5 cm. longis 5--10 mm. latis apicaliter subacutis marginaliter uniforme serrulatis basaliter acutis vel acuminatis ubique dense puberulis, supra rugosis; inflorescentiis axillaribus brevibus capitatis, capitulis ca. 1 cm. latis; bracteis ellipticis vel elliptico-ovalibus ca. 5 mm. longis 2--2.5 mm. latis puberulis.

A shrub, to 2 m. tall, apparently much branched and twiggy; branchlets and twigs very slender, gray, densely and minutely puberulent, glabrescent in age; internodes mostly much abbreviated, 0.5--1.5 cm. long; leaf-scars much elevated and projecting; leaves numerous, decussate-opposite; petioles filiform, 1--3 mm. long, densely and minutely puberulent; leaf-blades narrowly lanceolate, 2--2.5 cm. long, 5--10 mm. wide, apically subacute, marginally uniformly serrulate with small, rounded, and somewhat revolute teeth, basally acute or acuminate, lightly puberulent and deeply rugose above, densely puberulent beneath with very prominent venation reticulum; inflorescence axillary; peduncles filiform, about 2 cm. long, densely puberulent; heads about 1 cm. wide, conspicuously bracteate; bracts elliptic or elliptic-oval, about 5 mm. long and 2--2.5 mm. wide, apically acute or rounded, dorsally densely puberulent; corollas small, white.

The type of this species was collected by John D. Dwyer (no. 14543) -- in whose honor it is named -- in limestone soil at Xpujil, 16 miles west of the Pemex Station, Campeche, Mexico, on July 15, 1977, and is deposited in the Lundell Herbarium at the University of Texas, Austin.

A SYNOPTICAL REVIEW OF A REVISED CLASSIFICATION OF LILIOPSIDA (MAGNOLIOPHYTA) AS PROPOSED BY DAHLGREN AND CLIFFORD

Hollis G. Bedell and James L. Reveal
Department of Botany, University of Maryland,
College Park, MD 20742, U.S.A.

As we were preparing our paper on six recently published systems of angiosperm classification (Bedell & Reveal 1982), we were made aware of a forthcoming review of the monocotyledons (Liliopsida, Magnoliophyta) being prepared by Dahlgren and Clifford (1982). At this time we are presenting a synoptic review of this revision and in so doing are following the format used previously.

As before we are using the superorder ending *-anae* instead of the *-iflorae* ending presented by Dahlgren and Clifford (for the justification of this see Bedell & Reveal, in press). We are also presenting additional synonyms implied by Dahlgren and Clifford in their discussion.

As pointed out by Cronquist (1982) there are two systems of classification presented by Dahlgren and Clifford (1982), one at the beginning of the book (which is used throughout), and a second which is presented as a concluding statement. We have taken the details presented for the first (pp. 20-39) and added this information to the system given later (pp. 323); it is the second or "revised" classification that we are following.

Subclasses are indicated by Roman numbers; suborders by the Arabic number of the order plus a lower case letter beginning with "a"; and, families are indi-

cated by Arabic numbers. The distinction between orders and families may be noted by their terminations (*-ales* and *-aceae*). Recognized taxa appear in bold-face type while all synonyms (both explicit and implicit) appear in italics. The endings on synonyms have been deleted from the outline to save space. As before we urge caution in accepting some families names (and even higher taxa) as being validly published.

Following the outline of the system we have added an index. The taxa are listed alphabetically and are followed by either a Roman numeral (for subclasses), a capital letter (superorder), an Arabic number (order and families), or a combination of numbers and a letter (suborders) that indicate their placement in the system. Again, all synonyms appear in italics.

In order to make this new system (Dahlgren & Clifford, 1982) a part of the Dahlgren et al. (1981) system which we have reported on (Bedell & Reveal 1982), the numbers given here begin with those following the dicotyledons as arranged by Dahlgren et al.

LITERATURE CITED

- BEDELL, H.G., and J.L. Reveal.
1982. Amended outlines and indices for six recently published systems of angiosperm classification. *Phytologia*

51:65--156.

- _____. In press. The termination of the rank superorder: A proposal. *Taxon*.
- CRONQUIST, A. 1982. (A review of) The monocotyledons. A comparative study. *Brittonia* 34: 267-268.
- DAHLGREN, R.M.T., and H.T. CLIFFORD. 1982. *The monocotyledons: A comparative study*. Academic Press, Inc., London. 378 pp.
- DAHLGREN, R.M.T., S. ROSENDAL-JENSEN, and B.J. NIELSEN. 1981. A revised classification of the angiosperms with comments on correlation between chemical and other characters, p. 149-204. In: D.A. Young, and D.S. Seigler (eds.), *Phytochemistry and angiosperm phylogeny*. Praeger Publishers, New York.
- II. Monocotyledoneae (*Lilidae*)
- Y. Alismatanae
80. Hydrocharitales
365. Butomaceae
366. Aponogetonaceae
367. Hydrocharitaceae (*Halophil.*, *Thalassi.*, *Valisneri.*)
81. Alismatales
368. Alismataceae (*Limn-charit.*)
82. Zosteriales (*Najad.*, *Potamogeton.*)
369. Scheuchzeriaceae
370. Juncaginaceae (*Lilae.*)
371. Najadaceae
372. Potamogetonaceae (*Ruppi.*)
373. Zosteraceae
374. Posidoniaceae
375. Cymodoceaceae
376. Zannichelliaceae
- Z. Triuridanae
83. Triuridales
377. Triuridaceae
- AA. Aranae
84. Arales
378. Araceae (*Acor.*, *Pisti.*)
379. Lemnaceae
- BB. Lilliales (*Bromeli.*, *Haemodor.*, *Ponteder.*, *Tacc.*, *Typh.*)
85. Dioscoreales (*Tacc.*)
380. Dioscoreaceae
381. Stenomeridaceae
382. Trichopodaceae
383. Taccaceae
384. Stemonaceae (*Croomi.*, *Roxburghi.*)
385. Trillaceae
86. Asparagales (*Smilac.*)
386. Smilacaceae (*Petermanni.*, *Ripogon.*)
387. Philesiaceae (*Luzuriag.*)
388. Geitonoplesiaceae
389. Convallariaceae
390. Asparagaceae
391. Ruscaceae
392. Herreriaceae
393. Dracaenaceae
394. Nolinaceae
395. Doryanthaceae
396. Hanguanaceae
397. Dasypogonaceae
398. Xanthorrhoeaceae
399. Agavaceae
400. Hypoxidaceae
401. Tecophilaeaceae (*Lanari.*, *Walleri.*)
402. Cyanastraceae
403. Phormiaceae
404. Dianellaceae
405. Eriospermaceae
406. Asteliaceae
407. Aphyllanthaceae
408. Anthericaceae (*Ixioliri.*)
409. Asphodelaceae (*Aloe.*)
410. Hemerocallidaceae
411. Funkiaceae (*Host.*)
412. Hyacinthaceae (*Scill.*)
413. Alliaceae (*Agapanth.*, *Gilliesi.*)
414. Amaryllidaceae
87. Lilliales
415. Colchicaceae
416. Iridaceae (*Hewardi.*, *Isophysid.*)
417. Geosiridaceae
418. Calochortaceae

419. Alstroemeriaceae
 420. Tricyridaceae
 421. Liliaceae
 422. Melanthiaceae (*Petrosavi.*, *Protoliri.*)
 423. Campynemataceae
 88. Burmanniales
 424. Burmanniaceae
 425. Thismiaceae
 426. Corsiaceae
 89. Orchidales
 427. Apostasiaceae
 428. Cyrtopodiaceae
 429. Orchidaceae
 90. Velloziales
 430. Velloziaceae
 91. Bromeliales
 431. Bromeliaceae
 92. Haemodorales
 432. Haemodoraceae (*Conostylid.*, *Lophiol.*)
 93. Pontederiales
 433. Pontederiaceae
 94. Philydrales
 434. Philydraceae
 95. Typhales
 435. Sparganiaceae
 436. Typhaceae
 CC. Zingiberanae
 96. Zingiberales
 437. Lowiaceae
 438. Musaceae
 439. Heliconiaceae
 440. Strelitziaceae
 441. Zingiberaceae
 442. Costaceae
 443. Cannaceae
 444. Marantaceae
 DD. Commelinanae
 97. Commelinales
 445. Mayacaceae
 446. Commelinaceae (*Cartonemat.*)
 98. Eriocaulales
 447. Rapateaceae
 448. Xyridaceae (*Abolbod.*)
 449. Eriocaulaceae
 99. Juncals
 450. Thurniaceae
 451. Juncaceae
 100. Cyperales

452. Cyperaceae
 101. Hydatellales
 453. Hydatellaceae
 102. Poales (*Restion.*)
 454. Restionaceae (*Anarthi.*, *Ecdeiocole.*)
 455. Centrolepidaceae
 456. Flagellariaceae
 457. Joinvilleaceae
 458. Poaceae
 EE. Arecanae
 103. Arecales
 459. Arecaceae (*Palmae*)
 104. Cyclanthales
 460. Cyclanthaceae
 105. Pandanales
 461. Pandanaceae

INDEX TO TAXA

- Abolbodaceae*, 448
Acoraceae, 378
Agapanthaceae, 413
Agavaceae, 399
Alistmataceae, 368
Alistmatales, 81
Alistmatanae, Y
Alliaceae, 413
Aloeaceae, 409
Alstroemeriaceae, 419
Amaryllidaceae, 414
Anathraceae, 454
Antheraceae, 408
Aphyllanthaceae, 407
Aponogetonaceae, 366
Apostasiaceae, 427
Araceae, 378
Arales, 84
Aranae, AA
Arecaceae, 459
Arecales, 103
Arecanae, EE
Asparagaceae, 390
Asparagales, 86
Asphodelaceae, 409
Asteliaceae, 406

Bromeliaceae, 431
Bromeliales, 91
Bromeliana, BB
Burmanniaceae, 424

- Brumnniales, 88
Butomaceae, 365
- Calochortaceae, 418
Campynemataceae, 423
Cannaceae, 443
Cartonemataceae, 446
Centrolepidaceae, 455
Colchicaceae, 415
Commelinaceae, 446
Commelinales, 97
Commelinanae, DD
Conostylidaceae, 432
Convallariaceae, 389
Corsiaceae, 426
Costaceae, 442
Croomiaceae, 384
Cynastraceae, 402
Cyclanthaceae, 460
Cyclanthales, 104
Cymodoceaceae, 375
Cyperaceae, 452
Cyperales, 100
Cypripediaceae, 428
- Dasypogonaceae, 397
Dianellaceae, 404
Dioscoreaceae, 380
Dioscoreales, 85
Doryanthaceae, 395
Dracaenaceae, 393
- Ecdeiocoleaceae*, 454
Eriocaulaceae, 449
Eriocaulales, 98
Eriospermaceae, 405
- Flagellariaceae, 456
Funkiaceae, 411
- Geitonoplesiaceae, 388
Geosiridaceae, 417
Gilliesiaceae, 413
- Haemodoraceae, 432
Haemodorales, 92
Haemodoranae, BB
Heliconiaceae, 439
Halophilaceae, 367
Hanguanaceae, 396
Hemerocallidaceae, 410
- Herreriaceae, 392
Hewardiaceae, 416
Hostaceae, 411
Hyacinthaceae, 412
Hydatellaceae, 453
Hydatellales, 101
Hydrocharitaceae, 367
Hydrocharitales, 80
Hypoxidaceae, 400
- Iridaceae, 416
Isophysidaceae, 416
Ixioloriaceae, 408
- Joinvilleaceae, 457
Juncaceae, 451
Juncaginaceae, 370
Juncals, 99
- Lanariaceae*, 401
Lemnaceae, 379
Lilaeaceae, 370
Liliaceae, 421
Liliales, 87
Lilianaes, BB
Lilidae, II
Limnocharitaceae, 368
Lophiolaceae, 432
Lowiaceae, 437
Luzuriagaceae, 387
- Marantaceae, 444
Mayacaceae, 445
Melanthiaceae, 422
Monocotyledonae, II
Musaceae, 438
- Najadaceae, 371
Najadales, 82
Nolinaceae, 394
- Orchidaceae, 429
Orchidales, 89
- Palmae*, 459
Pandanaeae, 461
Pandanales, 105
Petermanniaceae, 386
Petrosaviaceae, 422
Philesiaceae, 387
Phormiaceae, 403

- Philydraceae*, 434
Philydrales, 94
Pistiaceae, 378
Poaceae, 458
Poales, 102
Pontederiaceae, 433
Pontederiales, 93
Pontederanae, BB
Posidoniaceae, 374
Potamogetonaceae, 372
Potamogetonales, 82
Protoliriaceae, 422

Rapateaceae, 447
Restionaceae, 454
Restionales, 102
Ripogonaceae, 386
Roxburghiaceae, 384
Ruppiaceae, 372
Ruscaceae, 391

Scheuchzeriaceae, 369
Scillaceae, 412
Smilaceae, 386
Smilacales, 86
Sparganiaceae, 435
Stemonaceae, 384
Stenomeridaceae, 381
Strelitziaceae, 440

Taccaceae, 383

Taccales, 85
Taccanae, BB
Tecophilaceaceae, 407
Thalassiaceae, 367
Thismiaceae, 425
Thurniaceae, 450
Trichopodaceae, 382
Tricyridaceae, 420
Trillaceae, 385
Triuridaceae, 377
Triuridales, 83
Triuridanae, Z
Typhaceae, 436
Typhales, 95

Vallisneriaceae, 367
Velloziaceae, 430
Velloziales, 90

Walleriaceae, 401

Xanthorrhoeaceae, 398
Xyridaceae, 448

Zannichelliaceae, 376
Zingiberaceae, 441
Zingiberales, 96
Zingiberanae, CC
Zosteraceae, 373
Zosterales, 82

ADDITIONAL NOTES ON THE GENUS *VITEX*. XXXVI

Harold N. Moldenke

VITEX TRIFOLIA var. *SIMPLICIFOLIA* Cham.

Additional bibliography: Franch. & Savat., Enum. Pl. Jap. 1: 360. 1875; Sugiura, Proc. Imp. Acad. Tokyo 12: 145. 1936; Jinno, Jap. Journ. Genet. 31: 148. 1956; Mold., Phytologia 52: 139 & 141--144. 1982.

Jinno (1956) reports the chromosome number for this plant as $n = 16$ -- this is most interesting in view of Sobti & Singh's (1962) report of $2n = 26$ for what they regarded as typical *Vitex trifolia* L. It is hoped that herbarium vouchers have been preserved somewhere to substantiate the identifications!

Merrill (1918) comments that "Although very distinct in habit, and in its leaves usually reduced to a single leaflet, I doubt very much if it is specifically distinct from the erect *Vitex trifolia* Linn." He cites Merrill, *Sp. Blanc.* 814 as illustrative of it [the present variety] and 302 as illustrative of typical *V. trifolia*. In his 1923 work he says that it is "A prostrate form with 1-foliolate leaves, occurring only on sandy beaches. Common on the coasts of Luzon and Mindanao, India to Japan, Malaya, and Polynesia."

Ridley records it from Pahang, Kelantan, Indo-Malaya, Australia, and Japan. Fernandez-Villar (1880) lists it from Luzon, Mindanao, Panay, and Cebu. Masamune (1955) records it from Amani-osima, Daitozima, Hirasima, Honshiu, Iheyazima, Iriomote, Isigaki, Kyushiu, Komi, Kumezima, Kutinosima, Miyako, Nakanosima, Sikoku, Taiwan, Takarazima, Tanegasima, Yakusima, and "Ogasawara to the tropics". Suzuki & Nakanishi record it from Dôzen and Dôgo islands in the Oki Islands of the Japan Sea.

Stone (1970) describes this plant as "A paleotropical strand plant, probably native in Guam, but uncommon [there]. The foliage is aromatic." Ohwi (1965) lists it from Honshu, Shikoku, Kyushu, Korea, Taiwan, the Bonin Islands, and the Ryukyu Island Archipelago. Hyland (1967) records it as cultivated in Maryland, based on *U. S. Dept. Agr. Pl. Invent.* 271881 and K.470 from Korea.

Linnaeus' original (1781) description of his *V. rotundifolia*, taken from Thunberg, is "*VITEX foliis simplicibus obovatis integerrimis, pedunculis axillaribus solitariis unifloris brevissimis. Habitat in Iaponia. Thunberg. Arbor facie & colore similis V. Agn-casto, foliis excepta. Folia fere subrotunda, bipollicaria. Pedunculi axillares, breves, uniflori.*"

Thunberg's original (1784) description of his *V. ovata* is "fol. ovalibus obtusis subtus tomentosis; panícula terminali trichotoma; caule decumbente repente."

Blanco (1837) describes his *V. repens* as "Tronco se extiende por la tierra. Hojas simples ovales, enteras y blanquecinas por debajo. Flores axillares, en panoja simple. Drupa globosa con la nuez de cuatro aposenos. = Esta especie se extiende muchísimo por

las playas del mar, y se hacé á lo mas como la muñeca: arroja tallos en donde toca en tierra. El fruto de esta y de otras especies, es poco mayor que on guisante, mui aromático, y como que se parece al de la pimienta. Flor. en Mayo y en otros meses."

Pételot (1953) says that "D'après Poilane (in Herb., no 1,448), la variété *unifoliata* est médicinale aux environs de Tourane au Center-Vietnam. Les feuilles récoltées sont mises dans un récipient et grillées à la façon du café, on les étale ensuite sur la terre pendant 20 minutes en les recouvrant d'un linge. On les lave et on les fait bouillir dans de l'eau. On obtient ainsi une boisson que l'on donne aux femmes après l'accouchement comme calmant et dépuratif."

Sonohara (1952) reports that in Japan it is "used for drugs and as a protection against sand", calling it "A semicreeping shrub, common on seashores there".

Hu (1981) gives its pharmaceutical name as "Fructus Viticis", the same as for typical *V. trifolia*. Altschul (1973) reports the seeds medicinal, based on an unnumbered Uno collection from Japan. Kashimoto (1964) gives an analysis of the oil extracted from the fruit.

Nagata (1971) tells us that in Japan a tea is brewed from the leaves, and that the leaves, seed, and wood are used in a bath in the treatment of backache, swollen feet, and rheumatism. Ebert (1907) and Hartwell (1971) report that in China it is employed to treat glandular tumors. Stargardt (1976) avers that in Thailand it is used in the making of sweets, for example, as a dark jelly.

Kimura and his associates (1967) isolated a flavone pigment, vitexicarpin, from the fruits, which pigment is identified as perhaps the same as casticin, 5,3',-dihydroxy-3 6, 7, 4'-tetramethoxyflavone (by mixed fusion with I. R. spectra). Hayashi and his associates (1969) found no vitexine or other flavone color in the roots.

It is worth noting that the illustration given by Pope (1968) as *V. trifolia* L. actually represents, instead, vars. *simplicifolia* and *subtrisecta*. Menninger's (1970) photograph 285 is labeled "*Vitex simplicifolia*" and photograph 286 is labeled "*Vitex trifolia*", but they are both identical and plainly represent var. *simplicifolia*.

Chamisso's original (1832) description of the variety is sometimes mis-cited as "Linnaea 8: 107" instead of "7: 107". Masamune's (1932) work is sometimes cited as "no. 121". Hepper & Silva describe the leaves as "glaucous", but they certainly are not so (at least, in the ordinary botanical sense of this word). Specht and some other collectors refer to the plant as a "perennial herb", but it certainly is never truly herbaceous. Santos 6210 shows several deeply 3-lobed leaves. The W. V. Brown 1605, cited below, bears a notation on its accompanying label that the plant was "perhaps cultivated".

Hallier (1918) cites Hallier 4230d from Hong Kong and 4230 & 4230a from Luzon. Williams (1905) cites Schomburgk 243 from Thailand; Craib (1911) cites Schmidt s.n. from the same country, while

Ridley (1911) cites Keith s.n. and Fletcher (1938) cites Annandale s.n., Bourke-Burrows s.n., Keith s.n., Kerr 16127, Lakshnakara 78, and Marcan 2262.

Dop (1928) cites Gaudichaud 114, Lecomte & Finet 933 & 2071, and Poilane 6074 from Annam, Godefroy 644 and Pierre s.n. from Cambodia, Gaudichaud s.n. and Harmand 844 from Cochinchina, and Bon 5503 from Tonkin.

Drake del Castillo (1892) cites Bastard s.n. from the Marquesas Islands, Hillebrand s.n., Macrae s.n., Mann & Bragham s.n., and Rémy 407 from the Hawaiian Islands, Forster s.n. from the Tongan Islands, and Barclay s.n., Homes s.n., and Seemann s.n. from the Fiji Islands.

Walker (1976) cites Field & Lowe 2lv, Fosberg 36971, Hatusima 17566, Kuidzumi s.n., and SIRI.5781, 5868, 6009, & 6028 from Okinawa, Fosberg 38480 & 48583 from Miyako, Okuhara & Sunigawa 54 from Irabu, and Fosberg 37605 from Taketami.

Hsiao (1978) cites Oldham 382, Price 494, Takenouchi s.n., and Wilson 10978 from Taiwan, and avers that the plant is found on sandy seashores from northern to southern Taiwan, as well as in China, Korea, Japan, and the Philippine Islands.

While most herbarium specimens exhibiting unifoliolate leaves with long petioles represent var. *subtrisecta* (Kuntze) Mold., Fortune 90 shows conspicuous petioles on what otherwise seems to be a specimen of var. *simplicifolia* -- perhaps it represents a hybrid.

Material of *V. trifolia* var. *simplicifolia* has often been misidentified and distributed in herbaria as *V. negundo* L., typical *V. trifolia* L., and even *Cordia* sp. On the other hand, the *W. V. Brown* 1655, Fosberg 37943, Henrickson 3933b, Hu 12469, and Rothdauscher s.n. [Manilla 1879], identified and distributed as *V. trifolia* var. *simplicifolia*, actually are var. *subtrisecta* (Kuntze) Mold., while Murata & al. T.17396 is *Premna foetida* Reinw. and "A. J." 4101 is *P. obtusifolia* var. *serratifolia* (L.) Mold. Wilkes s.n. is a mixture of *V. trifolia* var. *simplicifolia* and var. *subtrisecta*.

Additional citations: INDIA: Kerala: Silvarajan 485 (Ld), 4852 (Uc). SRI LANKA: Hepper & Silva 4757 (W--2719965). CHINA: Fukien: En 2224 (Mu). THAILAND: Charoenphol, Larsen, & Warncke 3427 (Ac); Larsen & Larsen 33723 (Ac); R. Schomburgk 243 (Pd); Surapat 45 (W--2450857). MALAYA: Pahang: Carrick 275 (Kl--1275). Trengganu: Herb. Univ. Malaya 5015 (Kl); "A. J." 4112 (Kl--7637); Sinclair 7526 (W--2913177); Soepadmo KLU.9116 (Kl--12913); Soepadmo & Magmud 9173 (Ne--57501). MALAYAN ISLANDS: Tioman: Soepadmo 1399 (Ac). CHINESE COASTAL ISLANDS: Hainan: Liang 64027 (Mu); Wang 33826 (Mi). Lantau: Taam 1702 in part (Mi, N); Ying 669 (Mi). HONG KONG: Chan 1079 (Mi); Fortune 90 (E--2168599); Hu 5894 (W--2711157), 12286 (W--2730642); Woo & Woo 475 (Mi). HONG KONG OFFSHORE ISLANDS: High: Hu 8635 (W--2697642). JAPAN: Honshu: Hiroe 14502 (Ws); Iwatsuki & Matsumura 5479 (Mu, N, W--2510031, Ws); Kirino 762 (Bl--158313); Maruyama & Okamoto 1600 (Ba, Bl--157676, Mi, Ws); Maximowicz s.n. [Yokohama, 1862] (Mu--1331, Pd); Okuyama s.n. [Aug. 14, 1949] (Ba); Sasaki & Togasi 606 (Ba, Se--161639,

Ws); Suzuki s.n. [Sept. 27, 1952] (Se--163328). Kyushu: Koyama 7043 (N, N); Oldham 626 (Mu--684, Pd); Tagawa 5276 (N), 5376 (Ws). Shikoku: Seto 18764 (Ne--62392). Tsushima: Ohashi, Ohba, & Tateishi 128 (W--2751556). Island undetermined: Siebold s.n. (Mu--683). TAIWAN: Koyama & Kao 8936 (N); Oldham 382 (Pd); Sasaki 380475 (Mi). RYUKYU ISLAND ARCHIPELAGO: Ikema: Fosberg 38583 (W--2647380). Irabu & Shimoji: Okuhara & Sunagawa 54 (W--2647381). Iriomote: Fosberg 37765 (W--2647391). Kutaka-shima: W. V. Brown 1605 (Au--165928). Miyako: Fosberg 38480 (W--2647366). Okinawa: Beauchamp 932 (W--2620640), 958 (W--2620672); Fosberg 36971 (W--2647379); Koyama 7311 (N). Taketomi: Fosberg 37605 (W--2647382). PHILIPPINE ISLANDS: Batan: Ramos, Herb. Philip. Bur. Sci. 80211 (Mi). Hermana Mayor: J. V. Santos 6210 (W--2246876). Luzon: Borden, Herb. Philip. Forest Bur. 1940 (W--850788); Escritor, Herb. Philip. Bur. Sci. 21171 (W--900853); Haenke s.n. (Mu); Lohr 4434 (W--446880); E. D. Merrill 323 (W--435308), Sp. Blanc. 814 (W--904496); Rothduscher s.n. [Manilla, 1879] (Mu--1528); J. V. Santos 6267 (W--2246897); Sinclair 9673 (W--2946519); Whitford 755 (W--851775). Mindoro: Mangubat, Herb. Philip. Bur. Sci. 926 (W--439733); E. D. Merrill 898 (W--435866). Palawan: Travis 75 (Ba). Sibuyan: Elmer 12135 (W--779767). Island undetermined: Cuming 1493 (Mu--1353). GREATER SUNDA ISLANDS: Selingan: Cockburn SAN.68413 (Id). NEW CALEDONIAN ISLANDS: New Caledonia: Schlecher 15548 (Mu--4091). FIJI ISLANDS: Island undetermined: Wilkes s.n. [Feejee Islands] (W--74077). AUSTRALIA: Northern Territory: Byrnes N.B.291 (Ai--14346); Chippendale 8159 (Ai); Maconochie 525 [Herb. North. Terr. 13596] (Ac); R. A. Perry 1223 (Ai, W--2072187); Specht 677 (W--2094859). Queensland: Helms 1132 (W--1348852). State undetermined: Walker s.n. [Cape Sidmouth] (Mu--1530). AUSTRALIAN ISLANDS: Facing: S. T. Blake 22530 (Ac). GREAT BARRIER REEF: Eagle: Stoddart 4815 (W--2744415). Fife: Stoddart 4956 (W--2744417). Ingram: Stoddart 4041 (W--2744418). Morris: Stoddart 4974 (W--2744419). Saunders: Stoddart 5074 (W--2744224). Sinclair: Stoddart 4189 (N, W--2744416). HAWAIIAN ISLANDS: Kauai: G. E. Douglas 383 (It); Fosberg 53663 (N, W--2669245), 56709 (N, W--2811358); A. A. Heller 273 [Meebold 24820] (Mu, W--368711), St. John, Britten, Cowan, Frederick, Webster, & Wilbur 22958 (Au--122935), 22967 (Au--122934). Maui: Topping s.n. [Herb. Degener 9504] (It, W--1626513). Molokai: O. Degener 9506 (W--1626514); Herbst & Spence 5733 (W--2893502); A. S. Hitchcock 15143 (W--874549). Oahu: R. S. Cowan 1060 (W--1993396); S. P. Darwin 1083 (W--2927104); O. Degener 10018 (W--1668216); Degener & Degener 34381 (Ac, Lc, Ld, N), 34391 (Mu); Fosberg 27125 (N, W--2676659); Hatheway & Caindec 139 (W--2159259); Meebold 20122 (Mu), 20480 (Mu); B. C. Stone 2721 (Kl--9897); Webster 1095 (Au--122933); Webster, Gankin, & Herbst 13843 (Mi); Young & Lowry 1622 (N). Island undetermined: J. G. Smith s.n. [Feb. 26, 1902] (W--412997). CULTIVATED: Florida: Dress 1518 (Ba). Hawaiian Islands: Iltis H.301 (Ld, Ws). Zimbabw: Biegel 3949 (Ba--374223). LOCALITY OF COLLECTION UNDETERMINED: Collector undetermined 101 (Mi). MOUNTED ILLUSTRATIONS: Degener, Fl. Haw. 315: *Vitex*: Trif: *Ovata* (Ba); Mak., Illustr. Fl.

Nipp. 186, fig. 558. 1940 (Ld, Ld).

VITEX TRIFOLIA var. *SIMPLICIFOLIA* f. *ALBIFLORA* (Y. Matsumura) Mold.

Additional bibliography: Mold., *Phytologia* 17: 117. 1968; Mold., *Fifth Summ.* 1: 353 (1971) and 2: 930. 1971; Mold., *Phytologia* 34: 266. 1976; Mold., *Phytol. Mem.* 2: 298, 302, & 595. 1980; Mold., *Phytologia* 48: 490. 1981.

Soepadmo describes this plant as a "creeping plant; leaves green above, glaucous beneath; calyx green; corolla white" and erroneously identified it as *V. negundo* L. The leaves are actually not truly glaucous beneath, at least, in the sense that this term is usually used in botany.

Additional citations: MALAYA: Trengganu: Soepadmo KLU.9173 (K1--12963).

VITEX TRIFOLIA var. *SUBTRISECTA* (Kuntze) Mold.

Additional synonymy: *Vitex rotundifolia* var. *heterophylla* Mak., *Illust. Fl. Nipp.* 186. 1940. *Vitex rotundifolia* var. *Sonohara*, Towada, & Amano, *Fl. Okin.* 133. 1952. *Vitex agnus-castus* var. *subtrisecta* Kuntze apud Mold., *Phytologia* 6: 165, in syn. 1958. *Vitex ineisa* Hartwell, *Lloydia* 34: 388. 1971. *Vitex rotundifolia* f. *heterophylla* (Mak.) Kitamura, *Act. Phytotax. Geobot.* 25: 34. 1972. *Vitex rotundifolia* var. *heterophylla* "[Roxb.] Makino" apud E. H. Walker, *Fl. Okin. South. Ryuk.* 894, in syn. 1976 [not *Vitex heterophylla* Roxb., 1814 & 1832].

Additional & emended bibliography: Roxb., *Hort. Beng.*, imp. 1, 46. 1814; Roxb., *Fl. Ind.*, ed. 2, 3: 75. 1832; Hassk., *Flora* 25: 26. 1842; Naves & Fern.-Villar in Blanco, *Fl. Filip.*, ed. 3, 4: 160. 1880; F. M. Bailey, *Cat. Indig. Nat. Pl. Queensl.* 35. 1890; Warb., *Engl. Bot. Jahrb.* 10: 429 (1890) and 13: 428--429. 1891; F. M. Bailey, *Queensl. Fl.* 4: 1179. 1901; Craib, *Kew Bull. Misc. Inf.* 1911: 443. 1911; Koord. & Valet., *Atlas Baumart. Jav* 6: fig. 292. 1914; Masamune, *Enum. Trach.* 7: 48. 1935; Mak., *Illyst. Fl. Nipp.* 186. 1940; Hara, *Enum. Sperm. Jap.*, imp. 1, 1: 191. 1948; Sonohara, Tawada, & Amano, *Fl. Okin.* 133. 1952; Masamune, *Sci. Rep. Kanazawa Univ.* 4: 48. 1955; Mold., *Phytologia* 6: 165 & 180--183 (1958) and 17: 116--119. 1968; Mold., *Résumé Suppl.* 16: 12 (1968) and 17: 12. 1968; Pope, *Wayside Pl. Haw.* 195 & 196, pl. 111. 1968; Corner & Watanabe, *Illustr. Guide Trop. Pl.* 770. 1969; A. L. Mold., *Phytologia* 18: 331. 1969; Hartwell, *Lloydia* 34: 388. 1971; W. H. Lewis, *Rhodora* 73: 47. 1971; Mold., *Fifth Summ.* 1: 31, 94, 263, 279, 284, 285, 291, 293, 294, 298, 303, 307, 311, 312, 314, 319, 329, 331, 333, 338, 341, 343, 344, 349, 351--353, & 375 (1971) and 2: 712, 727, 729, 792, & 930. 1971; Patel, *Forest Fl. Gujarat* 231. 1971; Hara, *Enum. Sperm. Jap.*, imp. 2, 1: 191. 1972; Kitamura & Murata, *Act. Phytotax. Geobot.* 25: 34. 1972; Mold., *Phytologia* 23: 424. 1972; Backer, *Atlas 220 Weeds [Handb. Cult. Sugarcane 7:]* pl. 521. 1973; Mold., *Phytologia* 25: 233 & 245 (1973), 28: 446, 448, & 452 (1974), and 31: 376 & 390. 1975; O. & I. Degener & Pekelo, *Haw. Pl. Names* X.1. 1975; Lakela, Long, Fleming, & Genell, *Pl. Tampa Bay*, ed. 3 [Bot. Lab. Univ. S. Fla.

Contrib. 73:] 117 & 183. 1976; Mold., Phytologia 34: 248, 254, & 268. 1976; E. H. Walker, Fl. Okin. South. Ryuk. 893--894, fig. 179. 1976; Clay & Hubbard, Haw. Gard. Trop. Shrubs 185 & 294. 1977; A. L. Mold., Phytologia 36: 87. 1977; Mold., Phytologia 36: 40. 1977; Fosberg, Sachet, & Oliv., Micronesica 15: 239. 1979; J. T. & R. Kartesz, Syn. Checklist Vasc. Fl. 2: 468. 1980; Mold., Phytologia 46: 42. 1980; Mold., Phytol. Mem. 2: 25, 87, 252, 253, 266, 274, 275, 280, 282, 283, 288, 290, 294, 298, 299, 302, 303, 305, 309, 319, 321, 323, 324, 328, 330--333, 339--343, 368, 459, & 595. 1980; Mold., Phytologia 48: 488 & 490 (1981), 50: 242 (1982), 51: 217, 344, & 351 (1982), and 52: 139 & 141. 1982.

Additional illustrations: Koord. & Valet., Atlas Baumart. Java 6: fig. 292. 1914; Pope, Man. Wayside Pl. 196, pl. 111 in part. 1968; Corner & Watanabe, Illust. Guide Trop. Pl. 770. 1969; Backer, Atlas 200 Weeds [Handb. Cult. Sugar-cane 7:] pl. 521. 1973; E. H. Walker, Fl. Okin. South. Ryuk. 894, fig. 179. 1976.

The type of this variety is *Kuntze 5817* from 2000 feet altitude in the "Willisgebirge" in Java, deposited in the Britton Herbarium at the New York Botanical Garden. The variety differs from the typical form of the species in usually being a dwarf, erect or prostrate shrub with both 1-foliolate and 3-foliolate leaves regularly or apparently irregularly interspersed on the branchlets; often the single leaflets are shallowly or deeply bi- or trisected or even binary.

It is a very variable taxon, perhaps actually consisting of more than a single taxon, apparently native from the littoral belt close to mangrove formations to riverbanks and inland hillsides as much as 4000 feet in altitude, from India, the Andaman Islands, Burma, Thailand, Malaya, and Indochina north to southern China and Japan, west to the Mascarene Islands and Madagascar, east through the Ryukyu and Philippine Islands to Indonesia, the Lesser Sunda Islands, New Guinea, New Caldeonia, Fiji, and Polynesia, and south to northern Australia. It is widely cultivated, especially as a hedge, and tends to persist or escape. It is regarded as medicinal on Hainan Island and the bark and roots provide a febrifuge in Thailand. In Sumatra the branches are burned and the resulting smoke is directed to aching joints.

It is very possible that *Vitex trifolia* var. *acutifolia* Benth. in Benth. & F. Muell., Fl. Austral. 5: 67 (1870) may prove to be the earliest and therefore valid name for this taxon, although it is now regarded as applying to the very similar Australian *Vitex benthamiana* Domin. A study of the type in the Kew herbarium is required to settle this matter.

The name, *V. rotundifolia* var. *heterophylla*, proposed by Makino, seems to have nothing to do with the *V. heterophylla* of Roxburgh [now regarded as a synonym of *V. quinata* (Lour.) F. N. Will.], in spite of the fact that Walker (1976) seems to think that it does.

Recent collectors describe *Vitex trifolia* var. *subtrisecta* as a prostrate or creeping woody plant, prostrate shrubby creeper, dense and erect or diffusely spreading bush or shrub, 0.5--4 m. tall, branched from the base, to a bushy tree, 5--8 m. tall, to 2

m. in diameter, often spreading by prostrate runners, scented like desert sagebrush (*Artemisia tridentata*), the flowering shoots erect, 20--30 cm. long; the leaves dull-green to dark- or gray-green above, "glaucous"-white to gray- or pale gray-green beneath, aromatic, some 1- and some 3-foliolate; the flowers profuse, aromatic, the corollas bilabiate, mint-like; and the fruit glaucous-green at first, later brown to dark-brown when ripe.

The corollas are said to have been "blue" on Buchholz 1536, Buden 58, D'Arcy 2950, Hu 12464, Lamoureux 2896, Sousa 11222, and Stoddart 4614, 4756, & 4849, "light-blue" on Shah MS.1212, "pale-blue with a white throat" on Specht 42, "blue-lavender" on Fosberg 37943, "bluish-purple" on Brumbach 8262, "blue-purple" on Hu 12469, "blue-mauve" on Schodde & Craven 4544, "mauve" on McKee 2401, "pale-purple" on Chippendale 8235, "purplish" on Correll & Meyer 44661, "purple" on King's Collector 388 and Walker 8125, "pale blue-purple" on Van Royen & Sleumer 8249, "pale-lavender" on Fay 203, "lavender" on Correll & Correll 48992, Correll & Kral 42981a, Fosberg 34926, and Henrickson 3933b, "deep-lavender to violet" on Fosberg 37681, "violet" on Fosberg 37304 & 58825 and Lewis 7124, and "lilac" on Chippendale 8162, Robinson 2446, and Stoddart 4466.

Recent collectors have encountered the plant on stable sand-dunes and dunes, sand-cays, hillsides and steep hillsides, seaward crests of sand-shingle cays, steep roadbanks, and roadcut walls, in disturbed ground, the margins of monsoon forests, riverbeds, grasslands, and mangrove forests, along the edges of sandy beaches and coppices, and in the bare shingles of shingle-mangrove islands. It is said to be common on sand beaches and on the dunes behind beaches, found from sealevel to 2000 feet altitude, in flower from February to December, and in fruit in February and June to December.

Schodde & Craven refer to it as a "tree of river margins" in New Guinea. Sherma encountered it in open grassland in Sumatra. In the Great Barrier Reef Stoddart refers to it as "occasional back of the beaches", "rare", "uncommon", or "locally common", while Fosberg reports it "forming scrub on berms of lagoon beaches" on Lizard Island and "common around the edges of thickets" on Kobama. Taam found it "abundant in dry sandy soil of level ground near beaches among scattered shrubs" on Lantao Island. Sachet reports it forming clumps in *Tournefortia* forests.

In the Bahamas the Corrells describe it as "common in vacant lots" and Correll & Kral refer to it as "weedy", but Lewis asserts that it is only "occasional and perhaps cultivated", certainly introduced. In the Northern Territory of Australia it occurs "on beach ridges in [the] zone of monsoon woodland with an annual rainfall of 60 inches".

Walker (1976) reports it "common on sandy seashores" on Okinawa and the southern Ryukyu Islands, the corollas there "blue, purple, or violet" in color. Corner & Watanabe (1969) describe it as a "Shrub of villages and waste places. Leaves 3-foliate, or 1-foliate, white-felted beneath. Flowers pale blue. Panicles

with short branches. Medicinal."

Sonohara and his associates (1952) record this plant from Kume and Iriomote; Masamune (1955) lists it from Isigaki, Obama, Iriomote, and "Taiwan to [the] tropics". Kitamura & Murata (1972) record it from Kyushu, Amami-oshima, the Ryukyu Islands, and southern China. Fosberg (1979) found it on Saipan, Tinian, Guam, Yap, Kusaie, Wake, Kwajalein, Banaba, and Nauru islands. Fay describes it as "tree-like shrubs forming hedges 3 m. tall" in Hawaii.

Hara (1948) describes the leaves as "aut simplicia aut tripartita". McKee refers to its as a "semi-prostrate herb". Buchholz was of the opinion that this plant is a member of the *Lamiaceae*.

Common and vernacular names reported for this variety are "ahinahina", "blue vitex", "kawariba-hamago", "kawari-hama-gō", "lagondee", "lagundi", "lemuning", "salagundi na hian", "salt-bush", "shirobana-hamago", and "variable-leaved vitex".

The "*Vitex trifolia*" of Long and his associates (1976), described as planted and "escaping locally" in the Tampa Bay region of Florida, actually is var. *subtrisetia*. The illustrations given by Backer (1973), Corner & Watanabe (1969), and Walker (1976) as typical *V. trifolia* L., actually represent var. *subtrisetia* instead, while that given by Pope (1968) depicts var. *simplicifolia* and var. *subtrisetia*. Elmer 15236 is a mixture of var. *bicolor* and var. *subtrisetia*, while Wilkes s.n. is a mixture with var. *simplicifolia*. The Merrill Sp. Blanc. 302, previously cited as var. *subtrisetia*, seems to be (in part, at least) typical *V. trifolia*. Elmer 7877, distributed as *V. negundo* and cited previously by me as typical *V. trifolia*, seems (at least, insofar as the U. S. National Herbarium specimen is concerned) definitely to represent var. *subtrisetia*. This is true also of Merrill 957 and Whitford 674.

Craib (1911) comments that the Schmidt collection which he cites as "*V. trifolia*" is typical var. *simplicifolia* but some of the Kerr 1248 specimens "show trifoliolate associated with unifoliolate leaves on the same branches" and thus probably represent what is now denominated as var. *subtrisetia*. Patel (1971) refers to a form in Gujarat as having "sessile 3-foliolate and simple leaves".

Fosberg comments that on his no. 34926 the "degree of dilation of [the] corolla-throat and [the] length of [the corolla-] tube plus the throat, [the] stamen length, [and the] style length [are] all variable in the same inflorescence." Of his no. 36709 he says "leaves trifoliolate on some bushes", but the U. S. National Herbarium sheet of this number shows the leaves 1-foliolate on long petioles -- a variability quite widespread in this taxon [cfr. Sivarajan 1199].

A number of collections, apparently of var. *subtrisetia*, have been distributed as var. *variegata* Mold. -- Spence 151 seems definitely to be var. *variegata*; Fay 203 has a notation by the collector on its accompanying label "some leaves variegated" and most of the Florida [U.S.A.] collections [e.g., those of Buswell, of Brumbach, and of Pecora], cited below, may very well be that form, even though the variegation is not evident on the herbarium specimens -- the Brumbach collection is said to have been taken from material

that had "escaped in thickets".

The Brown 1655 collection shows all the leaves 1-foliolate, but they are all long-petiolate, so it is definitely to be regarded as var. *subtrisecta*.

Walker (1976) cites Amano 8125, Carow 5, Field & Lowe 21v, Fosberg 36971, Hatusima 17566, Koidzumi s.n., SIRI 5781, 5868, 6009, & 6028 and Walker 8125 from Okinawa, Fosberg 38480 from Miyako, Fosberg 48583 from Ikema, Okuhara & Sunagawa 54 from Irabu, Fosberg 37605 from Taketomi, Fosberg 37943 from Kobama, Fosberg 37765, Kimura & Hurusawa 51, and SIRI 6601 & 6602 from Iriomote, and Fosberg 37304 from Ishigaki islands.

Lewis (1971) cites his no. 74 as "probably cultivated" in the Bahama Islands.

Material of this taxon has been distributed in herbaria under many names, including the following: *Vitex mollis* H.B.K., *V. negundo* L., *V. ovata* Thunb., *V. rotundifolia* Cham., *V. trifolia* L., *V. trifolia* L.f., *V. trifolia* var. *simplicifolia* Cham., *V. trifolia* var. *trifolia* [L.], *V. trifolia* var. *variegata* Mold., and *V. trifoliolata* L.

Additional citations: FLORIDA: Indian River Co.: D'Arcy 2950 (Sd--74237). Sanibel Island: Brumbach 8262 (Ml, N, W--2751430). MEXICO: Quintana Roo: Sousa 11222 (Ld). BAHAMA ISLANDS: Eleuthera: Correll & Correll 48992 (N). Grand Bahama: Correll & Kral 42981a (N); W. H. Lewis 7124 (Mu). San Salvador: Gillis 5281 (Ln--176347). INDIA: Kerala: C. B. Clarke s.n. [Malabar] (Pd); Hohenacker 703 (Mu--623); Silvarajan 1199 (Ld, Uc). BANGLADESH: J. M. Cowan s.n. (It). BURMA: Alsterlund 9 (Go, Go, Go, Ld). Shan States: Aplin s.n. [Nov. 1887] (Pd). Tenasserim: Helfer 6057 (Mu--624). Upper Burma: King's Collector 388 (Pd). CHINESE COASTAL ISLANDS: Hainan: Fung 20300 (Ml). Lantao: Taam 1702 (Ba, Ml). HONG KONG: Fortune 90 (Mu--681); Hu 12464 (W--2730669), 12469 (W--2730672). MALAYA: Singapore: Herb. Schlesisch. Bot. Tauschver. 113 (Mu--4381). RYUKYU ISLAND ARCHIPELAGO: Ishigaki: Fosberg 37304 (N, W--2647378), 37681 (N, W--2647367). Kobamajima: Fosberg 37943 (W--2647369). Okinawa: Amano 7191 (N); W. V. Brown 1655 (Au--165927); E. H. Walker 8125 (W--2619391). PHILIPPINE ISLANDS: Lubang: E. D. Merrill 957 (W--435930). Luzon: Elmer 7877 (W--629818), 15236 in part (W--897397); Loher 4436 (W--446881); Rothdauscher s.n. [Manilla, 1879] (Mu--1526, Mu--1527, Mu--1529); Whitford 674 (W--851725), 988 (W--851870). Mindanao: Copeland 691 (W--850502). GREATER SUNDA ISLANDS: Celebes: C. B. Robinson 2449 (W--775416). Jambongan: Cabiling 3981 (Pd). Java: Jelinek s.n. (Ba). Sumatra: Sherman 105 (Ba). LESSER SUNDA ISLANDS: Bali: Dilmy 944 (W--2724228). Timor: Herb. Mus. Paris s.n. (W--74076). WAKE ISLAND: Peale: Sachet 896 (W--2637957). NEW GUINEA: Papua: Schodde & Craven 4544 (W--2888729). West Irian: Van Royen & Sleumer 8249 (Ml). NEW HEBRIDES: Eromange: Macgillivray s.n. (Pd). NEW CALEDONIA: Buchholz 1536 (W--1968914); Deplanche 1048 (Pd); Forster 116 (Mu--680); Guillaumin 8540 (N); McKee 2401 (W--2192611); J. H. Taylor 47 (Ba). FIJI ISLANDS: Wilkes s.n. [Feejee Islands] in part (W--74077). Vanua Levu: A. C. Smith 6610 (W--1966794). Viti Levu: Gillespie 4380 (W--1599950); A. C. Smith

4559 (N), 6078 (N). AUSTRALIA: Northern Territory: Byrnes 14270 (Ai); Chippendale 8162 (Ai), 8235 (Ai); Sauer 3381 (Ws); Specht 42 (W--2094474). GREAT BARRIER REEF: Howick: Stoddart 4849 (W--2744032). Lizard: Fosberg 54993 (W--2739033). Low Wooded: Stoddart 4577 (W--2759871). Three Isles: Stoddart 4466 (W--2759698). Turtle-III: Stoddart 4756 (W--2744420). Two Isles: Stoddart 4614 (W--2759855). HAWAIIAN ISLANDS: Maui: Henrickson 3933b (W--2829004). LINE ISLANDS: Johnston: Fosberg 34926 (W--2399761); Lamoureux 2896 (W--2859715). TUAMOTU ARCHIPELAGO: Raroia: Doty & Newhouse s.n. [Doty 11730] (W--2129055). AUSTRAL ISLANDS: Rurutu: Fosberg 11981 (N); Stokes 1 (W--1968105). CULTIVATED: Australia: M. S. Clemens 43494a (N). Bahama Islands: Correll & Meyer 44661 (Ba); Gillis 7862 (Ft, Go). Florida: Buden 58 (Ws); Buswell s.n. [June 14, 1941] (Ba, Ba), s.n. [Aug. 21, 1941] (Ba, N); Gillis 9793 (Ft, Ld); Landingham 268 (Ne--578); Rohwer s.n. [July 21, 1963] (N); P. O. Schallert 23077 in part (Ws). Hawaiian Islands: L. M. Andrews 379 (N); Fay 203 (N); Sohmer s.n. [St. Louis Heights] (N, W--2812204). India: Herb. Hort. Bot. Calcutt.'s.n. (Pd). Kwajalein: Fosberg 36709 (W--2399505). New York: Pecora s.n. [Aug. 8, 1949] (N). Rita Island: Fosberg 58825 (W--2882943). Singapore: Shah MS.1212 (Ba). Sri Lanka: Moldenke, Moldenke, & Jayasuriya 28148 (W--2764409). MOUNTED CLIPPINGS: E. H. Walker, Fl. Okin. South. Ryuk. 894. 1976 (W).

VITEX TRIFOLIA var. *SUBTRISECTA* f. *ALBIFLORA* Mold.

Additional bibliography: Mold., *Phytologia* 17: 118--119. 1968; Mold., *Fifth Summ.* 1: 311 (1971) and 2: 727 & 930. 1971; Mold., *Phytol. Mem.* 2: 343 & 595. 1980.

Additional citations: AUSTRAL ISLANDS: Rurutu: *St. John* 16705 (W--1992883--isotype).

VITEX TRIFOLIA var. *VARIEGATA* Mold.

Additional synonymy: *Vitex trifolia* 'Variegata' Watkins, Fla. Landsc. Pl. 307. 1969; Mold., *Fifth Summ.* 2: 730, in syn. 1971. *Vitex trifolia* cv. 'Variegata' L. H. & E. Z. Bailey, *Hortus Third* 1162. 1976.

Additional bibliography: J. F. Morton, *Proc. Fla. Hort. Soc.* 75: 491. 1962; Mold., *Phytologia* 17: 118--119. 1968; J. F. Morton, *Proc. Fla. Hort. Soc.* 82: 418, fig. 4 (right). 1969; Watkins, Fla. Landsc. Pl., ed. 1, imp. 1, 307. 1969; Hodge, *Trop. Gard.* 128. 1971; Long & Lakela, *Fl. Trop. Fla.*, ed. 1, 739 & 961. 1971; Mold., *Fifth Summ.* 1: 351 & 375 (1971) and 2: 730 & 930. 1971; J. F. Morton, *Pl. Poison. People* 113 & 116. 1971; Mold., *Phytologia* 25: 245. 1973; Watkins, Fla. Landsc. Pl., ed. 1, imp. 4, 307 (1973) and ed. 1, imp. 5, 307. 1974; J. F. Morton, *500 Pl. S. Fla.* [151]. 1974; Balgooy & Vigel in Van Steenis-Kruseman, *Pacif. Pl. Areas* 3: 276. 1975; L. H. & E. Z. Bailey, *Hortus Third* 1162. 1976; Long & Lakela, *Fl. Trop. Fla.*, ed. 2, 739 & 961. 1976; Poppeton, Shuey, & Sweet, *Fla. Scient.* 40: 384. 1977; Lord, *Trees Shrubs Austral. Gard.*, ed. 5, 232. 1978; Perkins & Payne, *Guide Poison. Pl. Fla.* [Fla. Coop. Ext. Serv. Inst. Food Agric. Sci.

Circ. 441:] [53]. 1978; J. T. & R. Kartesz, Syn. Checklist Vasc. Fl. 2: 468. 1980; Mold., Phytol. Mem. 2: 341, 368, 460, & 595. 1980; Everett, N. Y. Bot. Gard. Illust. Encycl. Hort. 10: 3515. 1982; Mold., Phytologia 51: 340. 1982.

Additional illustrations: J. F. Morton, Proc. Fla. Hort. Soc. 82: 418, fig. 4. 1969; Watkins, Fla. Landsc. Pl., ed. 1, imp. 1, 307 (1969), ed. 1, imp. 4, 307 (1973), and ed. 1, imp. 5, 307. 1974.

Spence describes this plant, apparently growing wild on Kauai (Hawaiian Islands) as a "large shrub, 12 feet tall, growing at 50 feet altitude with *Pluchea* and *Lantana*, the leaves sometimes simple, sometimes trifoliolate, the leaflets obovate-oblongate, to 6 cm. long and 3 cm. wide, with whitish variegations along the midrib disappearing when dry, the young branches and leaves canescent, the inflorescence a narrow panicle at branch tips, the corollas blue". Neal, however, describing plants growing wild on Oahu notes "leaves 1--3-foliolate, some white-edged, corollas light-violet, darker on the lip". The Baileys (1976) say merely "Leaves variegated". Lord (1978) says "leaves broadly margined cream" and refers to the plant as a "very showy shrub". Morton (1969), in the illustration accompanying her comments, shows the leaflets very irregularly white-margined. She notes that "These aromatic plants [*V. trifolia* and the var. *variegata*] commonly planted as hedges in South Florida, cause respiratory irritation, especially when being trimmed and afterwards while the cuttings still are lying on the ground. Some people suffer not only asthma-like symptoms but also dizziness, headaches and nausea. Children sometimes chew the leaves but desist because of the burning taste. In the Far East, the leaves are placed in irrigation water in rice fields to protect the plants from pests, and dry, powdered leaves are used to repel insects from stored grain and clothes." For further information on the economic uses and chemical constituents of this plant, see Phytologia 51: 340 (1982).

Long & Lakela (1971) comment that in Florida this plant is "possibly a local escape" -- this is actually not a mere possibility, but a fact -- the species is not native in the New World.

It should be noted that because the variegation in this variety apparently very often becomes unnoticeable after the leaves are pressed and dried, the Brumbach 8262, Buswell s.n. [June 14 & Aug. 21, 1941], Rohwer s.n. [July 21, 1963], and Spence 151, cited by me as typical *V. trifolia* var. *subtrisecta* (Kuntze) Mold., may actually represent var. *variegata* instead, as, indeed, the collectors in at least some cases have suggested. Because of the 1--3-foliolate nature of the leaves, it would appear that this taxon is actually a form of *V. trifolia* var. *subtrisecta* and probably should be so designated. It seems to have originated naturally rather than horticulturally and therefore does not deserve the cultivar status often assigned to it. It has been collected in flower and fruit from May to August.

Additional citations: HAWAIIAN ISLANDS: Kauai: Spence 151 (W-- 2897554). Oahu: Neal s.n. [July 9, 1945] (M1). CULTIVATED: Florida: Lakela 29881 (N); Schallert 23077 (Mu).

VITEX TRIPINNATA (Lour.) Merr.

Additional & emended synonymy: *Tanaecium tripinna* Steud. in A. DC., Prodr. 9: 248. 1845; Buek, Gen. Spec. Syn. Candoll. 3: 469. 1858. *Vitex annamense* Dop, Bull. Soc. Hist. Nat. Toulouse 57: 203--204. 1928.

Additional & emended bibliography: Lour., Fl. Cochinch., ed. 1, 2: 391--392 (1790) and ed. 2, 476. 1793; A. DC., Prodr. 9: 248. 1845; Buek, Gen. Spec. Syn. Candoll. 3: 469. 1858; Dop, Bull. Soc. Hist. Nat. Toulouse 57: 203--204 & 210--211. 1928; E. D. Merr., Trans. Am. Phil. Soc., ser. 2, 24 (2): 335 & 444. 1935; Fedde & Schust., Justs Bot. Jahresber. 56 (2): 286. 1937; Mold., Phytologia 17: 119--120 (1968) and 18: 421. 1969; Anon., Biol. Abstr. 51 (1): B.A.S.I.C. S.226. 1970; Mold., Biol. Abstr. 51: 460. 1970; Hocking, Excerpt. Bot. A.18: 444. 1971; Mold., Fifth Summ. 1: 293, 298, 303, & 468 (1971) and 2: 640, 644, 645, 713, 720, 776, 930, & 931. 1971; Dournes, Journ. Agric. Trop. Bot. Appl. 20: 26, 52, & 184. 1973; Mold., Phytol. Mem. 2: 282, 288, 289, 290, 294, & 595. 1980; Mold., Phytologia 49: 457. 1981.

Both Hallier (1918) and Dop (1928) provide lengthy and very detailed descriptions of this species. Dournes (1973) encountered it in mountain forests, in flower in July, and notes that "La feuille est parfois utilisée comme masticatoire conjointement au bétel". More recent collectors refer to it as a "common tree in [the] open along rivers" (in Annam, at 300 m. altitude).

Additional & emended citations: VIETNAM: Annam: Poilane 2747 (W--2602628). Tonkin: Pételot 6419 (Mi); Pierre 5869 (W--2694085a).

VITEX TRIPINNATA var. *CLEMENSORUM* Mold.

Additional bibliography: Mold., Phytologia 17: 119 & 120. 1968; Mold., Fifth Summ. 1: 303 (1971) and 2: 931. 1971; Mold., Phytol. Mem. 2: 289, 294, & 595. 1980.

The type collection of this variety has previously been regarded as typical *V. tripinnata* (Lour.) Merr. and some specimens have been so distributed in herbaria.

Additional citations: VIETNAM: Annam: Clemens & Clemens 3394 (Mi--isotype, W--1427499--isotype).

VITEX TRIPINNATA var. *PUBESCENS* Mold., Phytologia 18: 421. 1969.

Bibliography: Mold., Phytologia 18: 421. 1969; Anon., Biol. Abstr. 51 (1): B.A.S.I.C. S.226. 1970; Mold., Biol. Abstr. 51: 460. 1970; Hocking, Excerpt. Bot. A.18: 444. 1971; Mold., Fifth Summ. 1: 298 & 303 (1971) and 2: 931. 1971; Mold., Phytol. Mem. 2: 288, 290, & 595. 1980; Mold., Phytologia 49: 457. 1981.

Recent collectors describe this plant as a small tree, 4--7 m. tall, the trunk to 15 cm. in diameter at breast height, the lower stems "often with straight thorns 3--4 cm. long", the inflorescence axes and calyx green, the corolla-lobes yellowish, the lower one whitish, the "palate and throat dark-yellow with maroon lines and blotches", and have encountered it in dry evergreen forests, in wet evergreen forests with *Corypha* and *Tetrameles*, and in mixed deciduous-bamboo forests, at 300--400 m. altitude,

in flower in April, and in fruit in October. They report the vernacular name, "sa khang".

Material of this variety has been misidentified and distributed in some herbaria as *V. quinata* (Lour.) F. N. Will. and as typical *V. tripinnata* (Lour.) Merr.

Additional citations: THAILAND: Indrapong & al. 149 (Ac); Larsen, Santisuk, & Warnsck 3273 (Ac, Ld); Maxwell 76-318 (Ac); Suksakorn 941 (Ed). LAOS: Vidal 2201 (Ld--type).

VITEX TRISTIS S. Elliot

Additional bibliography: Mold., Phytologia 17: 120. 1968; Mold., Fifth. Summ. 1: 263 (1971) and 2: 931. 1971; Mold., Phytol. Mem. 2: 252 & 595. 1980.

VITEX TURCZANINOWII Merr., Govt. Lab. Philip. Publ. 35: 77. 1906.

Synonymy: *Vitex altissima* Walp., Nov. Act. Acad. Nat. Cur. 19, Suppl. 1: 380. 1843 [not *V. altissima* Blanco, 1837, nor Heyne, 1955, nor L., 1832, nor L. f., 1791, nor Moon, 1824, nor Naves, 1880, nor Naves ex F. Villar, 1954, nor Roxb., 1829]. *Vitex undulata* Walp., Nov. Act. Acad. Nat. Cur. 19, Suppl. 1: 380 & 383. 1843 [not *V. undulata* Wall., 1829]. *Premna (Gumira) philippinensis* Turcz., Bull. Soc. Nat. Mosc. 36 (2): 215. 1863 [not *Vitex philippinensis* Merr., 1903]. *Viticipremna turczaninowii* (Merr.) H. J. Lam, Verbenac. Malay. Arch. 162. 1919. *Viticipremna philippinensis* (Turcz. H. J. Lam in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 47. 1921. *Viticipremna turczaninowii* H. Lam apud E. D. Merr., Enum. Philip. Flow. Pl. 3: 397, in syn. 1923. *Viticipremna philippinensis* H. Lam apud E. D. Merr., Enum. Philip. Flow. Pl. 3: 397, in syn. 1923. *Viticipremna turczaninowii* H. J. Lam apud A. W. Hill, Ind. Kew. Suppl. 6: 85. 1926. *Viticipremna philippinensis* H. J. Lam apud A. W. Hill, Ind. Kew. Suppl. 7: 252. 1929. *Viticipremna turczaninowii* "[Merr.] H. J. Lam" apud Fedde & Schust., Justs Bot. Jahresber. 53 (1): 1077, in syn. 1932. *Vitex denudata* Reinw. ex Mold., Résumé 382, in syn. 1959.

Bibliography: Walp., Nov. Act. Acad. Nat. Cur. 19, Suppl. 1: 380 & 383. 1843; Walp., Repert. Bot. Syst. 4: 84. 1845; Schau. in A. DC., Prodr. 11: 685. 1847; Turcz., Bull. Soc. Nat. Mosc. 36 (2): 215. 1863; Fern.-Villar in Blanco, Fl. Filip., ed. 3, Nov. App. 159. 1880; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 622. 1894; K. Schum. & Lauterb., Fl. Deutsch. Schutzg. Südsee 524. 1900; E. D. Merr., Philip. Journ. Sci. Bot. 1, Suppl. 1: 121. 1906; E. D. Merr., Govt. Lab. Philip. Publ. 35: 77. 1906; Prain, Ind. Kew. Suppl. 3: 189. 1908; D. H. Scott in Solereder [transl.^o Boodle & Fritsch], Syst. Anat. Dicot. 1: 633. 1908; E. D. Merr., Spec. Blanc. 333. 1918; H. J. Lam, Verbenac. Malay. Arch. 162--163 & 370. 1919; H. J. Lam in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 47. 1921; E. D. Merr., Enum. Philip. Flow. Pl. 3: 397. 1923; H. J. Lam in Lauterb., Engl. Bot. Jahrb. 59: 92. 1924; A. W. Hill, Ind. Kew. Suppl. 6: 85. 1926; Pieper, Engl. Bot. Jahrb. Beibl. 141: 80. 1928; A. W. Hill, Ind. Kew. Suppl. 7: 252. 1929; Wangerin, Justs Bot. Jahresber. 50 (1): 237. 1930; Fedde, Justs Bot. Jahresber. 50 (1): 719. 1932; Fedde & Schust., Justs

Bot. Jahresber. 53 (1): 1077. 1932; Junell, Symb. Bot. Upsal. 1 (4): 94, fig. 144. 1934; Fedde & Schust., Justs Bot. Jahresber. 60 (2): 576--577 & 676. 1941; Wangerin, Justs Bot. Jahresber. 60 (1): 825. 1941; Mold., Alph. List Inv. Names 55. 1942; Mold., Phytologia 2: 123. 1945; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 2: 622. 1946; Angely, Cat. Estat. Gen. Bot. Fan. 17: 6. 1956; Mold., Résumé 155, 191, 339, 382, 390, 391, & 479. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 2: 622. 1960; Maun, Philip. Journ. Forest. 16: 108. 1960; Menninger, Flow. Trees World 335. 1962; F. A. Barkley, List Ord. Fam. Anthoph. 76 & 219. 1965; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 7, 1184. 1966; Rouleau, Guide Ind. Kew. 198 & 353. 1970; Balgooy, Blumea Suppl. 6: [Pl. Geogr. Pacif.] 200. 1971; Mold., Fifth Summ. 1: 319 & 329 (1971) and 2: 610, 716, 730, 732, 758, & 931. 1971; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 8, 1214. 1973; Mold., Phytologia 26: 512. 1973; Hegnauer, Chemotax. Pfl. 6 [Vhem. Reihe 21]: 678. 1973; Mold., Phytologia 31: 391 & 399. 1975; L. H. & E. Z. Bailey, Hortus Third 1149. 1976; Mold., Phytologia 44: 219, 221, & 512. 1979; Fosberg, Otobed, Sachet, Oliver, Powell, & Canfield, Vasc. Pl. Palau 38. 1980; Mold., Phytol. Mem. 2: 328, 329, 368, 460, & 596. 1980; Mold., Phytologia 49: 373, 457, & 459 (1981), 50: 253, 255, 267, & 270 (1982), 51: 163 & 274 (1982), and 52: 134. 1982.

Turczaninow's original (1863) description of this is "*Premna ramis acute tetragonis, superne compressis, ad nodos incrassatis; foliis longe petiolatis ovatis, ovato-oblongisve, obtusosculis acuminatis aut vix in petiolum attenuatis, utrinque glabris, supra tamen puncticulis exasperatis; panicula terminali pyramidata cum calycibus corollisque tenuissime puberula; calyce truncato aut denticulis obsoletis instructo; corolla calyce duplo majore ad faucem pubescente; staminibus subdidynamis. Antherae reniformes, loculis discretis divaricatis. Aegiphila viburnifolia Juss., cujus specimina tantum fructifera nota, recedit a nostra, corymbis praeter nonnullos axillaribus, caeterum forte eadem est planta. Rami exsiccati nigrescunt. Filamenta in eodem curculo orta, sed interiora duo caeteris paulo breviora. Insulae Philippinae, Cuming No 1172 et 1294." The *Aegiphila viburnifolia* referred to here is a synonym of *Elaeodendron viburnifolium* (A. L. Juss.) Merr., in the *Celastraceae*.*

Merrill (1906) comments that "This species which belongs in *Vitex*, rather than in *Premna*, was based on Nos. 1172 and 1294 of Cuming's Philippine collection, both these numbers being represented in the herbarium of this Bureau [Bureau of Science, Manila -- the original herbarium now destroyed]. *Premna philippinensis* Turcz. is not mentioned by Vidal (Phan. Cuming. Phillip. 1885) but No. 1172 is referred by him to *Rourea multiflora* Planch. [Connaraceae], and No. 1294 to *Vitex* sp. indet. Turczaninow evidently described it from fragmentary material, as his diagnosis leads one to infer that the leaves are simple. As his diagnosis in other respects applies exactly to the above

numbers of Cuming's collection in our herbarium, it seems evident that he had only specimens with detached leaflets. The following should be added to the description of the leaf characters. Leaves 5, rarely 4 or 3 foliolate; petioles glabrous, 8 to 10 cm. long; petiolules 1 to 2 cm. long. Flowers yellow. In addition to the two numbers of Cuming's Philippine collection referred by Turczaninow to this species, it is apparently well represented also by No. 1173 Cuming, and the following specimens of more recent collection: Luzon, Province of Bataan, Lamao River (1335 Whitford) (3059 Borden), May, 1905; Province of Rizal, Bosoboso (2951 Ahern's collector), April, 1905; San Mateo (1127 Ahern's collector), May, 1904; Province of Tayabas, Pagbilao (2852 Merrill), April, 1903. Island of Ticao (1096 Clark), May, 1904." On the clipping with this original publication of the name, *Vitex turczaninowii*, in my possession, Merrill has written the date "1905", and Lam (1919) also so dates it. In later publications Merrill dates it "1906". In his 1923 publication he says that this is "A species badly confused with *Vitex heterophylla* Roxb. = *V. quinata* F. N. Will., the type cited by H. J. Lam under both. The leaves are practically glandless, while the flowers are always yellow, not blue. I can see no valid reason for recognizing the genus *Viticipremna*." He lists the species from Batan, Luzon, Mindoro, Ticao, Leyte, and Mindanao on the basis of (in addition to the collections mentioned above) Ahern's Collector 2961, Alambra & Borrromeo 25884, Barros 20465, Bawan 24194, Merrill Philip. Pl. 382, and Peñas, Philip. Forest Bur. 26677. Of the species he says that it is found in forests at low altitudes and is endemic to the Philippine Islands.

Lam (1921) says of this plant: "Leaves 3--5-foliate; calyx 0.2--0.3 c.m.; corolla always as in *Premna*, 4-lobed, one lobe larger, rounded, 0.2--0.4 c.m., the other 3 obtusely deltoid, 0.15--0.2 c.m.; tube 0.5 c.m.; stamens didynamous, 0.5--0.6 and 0.6--0.75 c.m." He cites from the Bogor herbarium Ahern's Collector 2961, Borden 3059, Clemens s.n., Elmer 16693, Merritt & Darling 14049, and Ramos 1410. He expresses doubt as to whether the Borden and the Merritt & Darling collections really belong here - of the former he notes "an var.?: leaves with simple hairs beneath".

The *Vitex undulata* Wall., referred to in the synonymy (above), is a synonym of *V. quinata* (Lour.) F. N. Will., *V. philippinensis* Merr. is a synonym of *Teijsmanniodendron pteropodum* (Miq.) Bakh., *V. altissima* Names and "Naves ex F. Villar" is *V. parviflora* A. L. Juss., while the *V. altissima* of Linnaeus, Linnaeus filius, Heyne, Moon, and Roxburgh are all *V. altissima* L.f.

Common and vernacular names recorded for *V. turczaninowii* are "boñgogon", "hamuráun-asu", "kalimantau", "kamalan", "liño-liño", "linolino", "liño-liño", "magomo", "mala-moláve", "malamuláin", "maláuing-aso", "mala-usd", "mbothawa", "muláuin", "tugas", "tugas-buñgogon", "vasung", and "yarokaswaw".

Recent collectors have encountered this plant in woods and forests, especially on stream margins, and in sandy soil on low ridges, at 40 m. altitude, in flower from April to August, as well

as in December, and in fruit in May, July, and November. They describe it as a tree, 13--25 m. tall, the bole to 12 m. high, the trunk diameter to 50 cm. at breast height, the buttresses to 1 m. long, the bark yellowish-brown, deeply fissured, with strips 2--4 cm. wide and 4 mm. thick, the living bark 5 mm. wide, yellowish, the wood white, the inflorescence gray, and the flowers fragrant. The corollas are said to have been "dirty-white, the lower lip dark-purple inside" on *Kostermans 6895*, "flower buds green, pink-tinged, the corollas white, purple-tinged in the throat within" on *Smith 8881*, and "purple-white and green" on *Wenzel 2758* -- all this in spite of Merrill's emphatic statement that the corolla in *V. turczaninowii* is always yellow, while in the similar *V. quinata* it is blue. Probably these collections should be re-examined.

Vitex denudata appears to be based on an unnumbered Reinwardt collection deposited in the Vienna herbarium.

In *Phytologia* 49: 371--372 (1981) there is a discussion of Blanco's *V. latifolia*, *V. geniculata*, and *V. altissima* and Merrill's opinion that the 5-foliolate specimens mentioned by Blanco refer to *V. turczaninowii*.

It is perhaps also worth mentioning here that the Schumann & Lauterbach (1900) reference in the bibliography (above) is often mis-cited as "1901". Walpers (1845) is erroneously cited by Merrill (1923) as "1844", but pages 1--192 of the volume concerned here were actually not issued until 1845; Merrill (1906) also mis-cites the Fernandez-Villar (1880) reference as "1883".

The Merrill 2162 collection is sterile and exhibits 3- and 5-foliolate leaves -- it may prove not to belong to this species. Similarly, Curran, *Philip. Forest Bur. 10338* is also sterile and is very anomalous in general appearance -- it exhibits a pair of unifoliolate leaves in addition to the usual 3-foliolate ones. It may not be placed here correctly.

Material of *V. turczaninowii* has been abundantly misidentified and distributed in some herbaria, and even cited by me in previous installments of these notes, as *V. quinata* (Lour.) F. N. Will. or as *V. quinata* var. *puberula* (H. J. Lam) Mold. On the other hand, the Ahern's Collector 2961 and Ramos & Edaño, *Philip. Bur. Sci. 45318*, distributed as *V. turczaninowii*, seem actually better regarded as representing *V. quinata* (Lour.) F. N. Will., while Ramos, *Philip. Bur. Sci. 1410* and Whitford 1335 are *V. turczaninowii* f. *puberula* (H. J. Lam) Mold. and Borden, *Philip. Forest Bur. 3059* is *V. velutina* (Koord. & Val.) Koord.

Citations: KOREAN COASTAL ISLANDS: Botel Tobago: *Chang 15019* (W--2920633). PHILIPPINE ISLANDS: Batangas: *Loator s.n.* [Gates 8408] (M1). Leyte: *Wenzel 809* (W--1238085), 1399 (N). Luzon: Ahern's Collector, *Philip. Forest Bur. 1127* (N, W--851239), 2961 (Bz--25362, N, Po--64780, W--852149); Bartlett 15339 (M1), 15374 (M1); Bawan, *Philip. Forest Bur. 24194* (W--1290183); Bridges, *Philip. Forest Bur. 5167* (N, W--709268); M. S. Clemens 15848 (Ca--260653); Cuming 1172 [Herb. Reichenbach f. 158525, 158526, & 158527] (E--116194--cotype, Ld--photo of cotype, Mu--1465--cotype,

N--photo of cotype, V--cotype, V--cotype, V--cotype), 1294 (N--cotype); H. M. Curran, Philip. Forest Bur. 5837 (Br), 10338 (W--708781), 10505 (Br), 10639 (Br); Elmer 16693 (Bi, Bz--25368, Ca--271800, Mi, N, S, Ut--67346, W--897398); Loher 12537 (Ca--243057); Manuel, Philip. Forest Bur. 23490 (W--1376032); E. D. Merrill 2196 (W--437144), 2852 (N, W--437822); Merritt & Darling, Philip. Forest Bur. 14049 (Bz--25366); M. Ramos 382 (Mu--4276, Ut--22208, W--1178292), Philip. Bur. Sci. 1410 (Bz--25363, N. W--626588); Ramos & Edaño, Philip. Bur. Sci. 45318 (Bz--25361, Ca--308842, N, Pd); Villamil 258 [Herb. Philip. Forest Bur. 20294] (Ka--64784); Whitford 1335 (N, W--852078). Mindanao: M. S. Clemens s.n. [Camp Keithley, July 1907] (Bz--25364, Bz--25365, Bz--25367, Mu--4107, Mu--4706, Mu, W--850229); Sherfese, Cenabre, & Ponce, Philip. Forest Bur. 21668 (W--837748); Villamil, Philip. Forest Bur. 22017 (W--1238300); Wenzel 2523 (Mi), 2563 (Br, Mu, N, N), 2758 (Ca--316959), 2760 (B), 3430 (Br, Ca--354967, Cp, Mu, N, N). Mindoro: E. D. Merrill 2162 (W--437110); Merritt, Philip. Forest Bur. 9912 (N). Ticao: W. W. Clark, Philip. Forest Bur. 1096 (W--626200). GREATER SUNDA ISLANDS: Borneo: Kostermans 6895 (Ba). Java: Reinwardt s.n. (V). FIJI ISLANDS: Viti Levu: O. Degener 14481 (W--1943746); A. C. Smith 4307 (W--1965194), 6295 (W--1966528), 8881 (W--2191502).

VITEX TURCZANINOWII f. *PUBERULA* (H. J. Lam) Mold., Phytologia 51: 163. 1982.

Synonymy: *Vitex heterophylla* var. *puberula* H. J. Lam, Verbenac. Malay. Arch. 189 [as "(Miq.) H. J. Lam"]. 1919. *Vitex heterophylla* var. *puberula* (Miq.) H. J. Lam, Verbenac. Malay. Arch. 189. 1919. *Vitex quinata* var. *puberula* (H. J. Lam) Mold., Phytologia 3: 489. 1951. *Vitex mindanaensis* Merr. ex Mold., Résumé Suppl. 4: 21, in syn. 1962.

Additional bibliography [for earlier lists see Phytologia 6: 103 (1957), 8: 77 (1961), 17: 31 (1968), and 49: 458. 1981]: H. J. Lam in Lam & Bakh., Bull. Jard. Bot. Buitenz., ser. 3, 3: 47. 1921; Mold., Phytologia 51: 163 (1982) and 52: 134. 1982.

Brooke describes this plant as a medium-sized tree and found it growing in light forests at 1000 m. altitude, flowering in August.

Material of this form has been widely mis-identified and distributed in herbaria as *V. quinata* (Lour.) F. N. Will. On the other hand, the Canton Chr. Coll. 12613, Ching 5552, Curran, Philip. Forest Bur. 10338, Keng 1369, Merrill 2196, and Pételot 963, previously regarded as this form, are now regarded as representing typical *V. quinata* (Lour.) F. N. Will., while Mungkim 45115 and Sutriano 34 are regarded as typical *V. turczaninowii* Merr.

Additional citations: PHILIPPINE ISLANDS: Mindanao: Elmer 11602 (W--873093). GREATER SUNDA ISLANDS: Celebes: Palit 16 [Boschproefst. bb.29476] (Mi). Sarawak: Brooke 10354 (W--2332023). Sumatra: Yates 1609 (Mi). MOLUCCA ISLANDS: Mangeli: Herb. Neth. Ind. Forest Serv. bb.29773 (Mi). AROE ISLANDS: Oedjir: Herb. Neth. Ind. Forest Serv. bb.2548 (Mi). FIJI ISLANDS:

Viti Levu: A. C. Smith 9119 (W--2192126).

VITEX UBANGHENSIS A. Chev.

Additional bibliography: Mold., Phytologia 17: 120. 1968; Mold., Fifth Summ. 1: 227 (1971) and 2: 931. 1971; Mold., Phytol. Mem. 2: 218 & 595. 1980.

VITEX UMBROSA Sw.

Additional bibliography: Raeusch., Nom. Bot., ed. 3, 182. 1797; Willd. in L., Sp. Pl., ed. 4, 3 (2): 392--393. 1802; Sabine, Trans. Hort. Soc. Lond. 5: 455. 1824; Sweet, Hort. Brit., ed. 1, 1: 323 (1826) and ed. 2, 416. 1830; Loud., Hort. Brit., ed. 1, 246 (1830) and ed. 2, 246. 1832; G. Don in Loud., Hort. Brit., ed. 3, 246. 1839; G. Don in Sweet, Hort. Brit., ed. 3, 551. 1839; D. Dietr., Syn. Pl. 3: 612. 1843; Voigt, Hort. Suburb. Calc. 473. 1845; Walp., Repert. Bot. Syst. 4: 87--88. 1845; Schau., Linnaea 20: 483. 1847; Schau. in A. DC., Prodr. 11: 687. 1847; Buek, Gen. Spec. Syn. Candoll. 3: 502. 1858; Ulrich, Internat. Wörterb., ed. 1, 254 (1871) and ed. 2, 254. 1875; Knuth, Feddes Repert. Spec. Nov. Beh. 43: [Init. Fl. Venez.] 607. 1927; Ekman, Arkiv Bot. Stockh. 22A: 51. 1929; Mold., Phytologia 1: 103 (1934) and 17: 120. 1968; Mold., Biol. Abstr. 49: 11291. 1968; Hocking, Excerpt. Bot. A.15: 421. 1970; Mold., Fifth Summ. 1: 101 (1971) and 2: 573 & 931. 1971; Adams, Flow. Pl. Jamaica 636, 791, & 846. 1972; Alemán Frías, Aurich, Excurra Ferrer, Gutiérrez Vázquez, Horstmann, López Rendueles, Rodríguez Graquitená, Roquel Casabella, & Schreiber, Die Kulturpfl. 19: 423. 1972; Farnsworth, Pharmacog. Titles 8 (8): xxxiii. 1973; León & Alain, Fl. Cuba, ed. 2, 2: 318. 1974; Mold., Phytologia 32: 338. 1975; López-Palacios, Fl. Venez. Verb. 595 & 654. 1977; Mold., Phytologia 44: 416. 1979; Mold., Phytol. Mem. 2: 94, 363, 423, & 595. 1980; Mold., Phytologia 48: 486. 1981.

Although this species was originally described from Jamaica and Raeuschel (1797) lists it from "Jamaica" and both Loudon (1832) and Sweet (1830) correctly credit it to the "W. Indies", Dietrich (1843) amazingly attributes it to "Ind. or." [eastern India]. The species is actually endemic to Jamaica. According to Loudon and Sweet, it was introduced into cultivation in England in 1824, and they call it the "bushy chaste-tree". Ekman (1929) avers that it grows "Throughout Haiti", but the species he is referring to is the very similar *V. heptaphylla* A. L. Juss. Similarly, Knuth (1927) records it from Venezuela on the basis of Pittier 8883, but the Venezuelan plant is *V. compressa* Turcz.

Adams (1972) describes the true *V. umbrosa* as a "Tree 8--15 m. high; bark flaky; trunk up to 1 m. in diameter, fluted at base; leaves with (4) 5 (-6) leaflets; leaflets elliptic-lanceolate, broadly cuneate to rounded at base, obtuse to shortly and bluntly acuminate at tip, up to 20 cm. long and 8.5 cm. broad; petioles up to 11 cm. long; petiolules 0.6--4.5 cm.; inflorescences axillary; calyx 3--5 mm. long; corolla purple to blue-violet, hairy, about 14 mm. long; drupe yellow." He states that in Jamaica the tree is occasional in pasture margins and on wooded hillsides, from 500 to

1800 feet altitude, flowering from May to September, and fruiting from June to September. He cites *Harris 10579* & *11975* and *Proctor 19783*, and notes "Probably endemic, although reported from Hispaniola" -- as stated above, the Hispaniolan plant is *Vitex heptaphylla*.

Recent collectors refer to *V. umbrosa* as a tree, 30--50 feet tall, the trunk to 50 cm. in diameter at breast height, the leaves light-green, the flowers scented, and the fruit orange in color, and have encountered it on wooded limestone hillsides and steep forested hillsides, at 1000--1400 feet altitude, in fruit in June and September. Stearn describes the corolla as "purple with a yellow blotch at the top of the lower lip". The *Proctor 19783* collection is accompanied by a wood sample.

The *Ekman H.12643* and *Valeur 630, 936, & 972*, distributed as *V. umbrosa*, are *V. heptaphylla* A. L. Juss.

Additional citations: JAMAICA: *Proctor 19783* (W--2585137); 36296 (N); *Stearn 974* (Ba).

VITEX UNIFLORA J. G. Baker

Additional bibliography: Mold., *Phytologia* 17: 240. 1968; Mold., *Biol. Abstr.* 50: 942. 1969; Hocking, *Excerpt. Bot. A.15*: 421. 1970; Mold., *Fifth Summ.* 1: 264 (1971) and 2: 931. 1971; Mold., *Phytol. Mem.* 2: 252 & 595. 1980.

VITEX URCEOLATA C. B. Clarke

Additional synonymy: *Vitex n. 12* Hook. f. & Thoms. ex C. B. Clarke in Hook. f., *Fl. Brit. India* 4: 585, in syn. 1885.

Additional & emended bibliography: C. B. Clarke in Hook. f., *Fl. Brit. India* 4: 585--586. 1885; Forbes & Hemsl., *Journ. Linn. Soc. Lond. Bot.* 26 [Ind. Fl. Sin. 2]: 259. 1890; Parkinson, *Forest Fl. Andam., imp.* 1, 220 & 221. 1922; Dop, *Bull. Soc. Hist. Nat. Toulouse* 57: 201, 210, & 211. 1928; H. N. & A. L. Mold., *Pl. Life* 2: 70. 1948; Mold., *Phytologia* 17: 240--241. 1968; Mold., *Fifth Summ.* 1: 279, 285, 291, 298, 303, 307, 314, & 329 (1971) and 2: 572, 718, 721, 728, & 931. 1971; Mold., *Phytologia* 23: 438. 1972; Parkinson, *Forest Fl. Andam., imp.* 2, 220 & 221. 1972; Mold., *Phytol. Mem.* 2: 266, 274, 275, 280, 288, 294, 298, 305, 319, 460, & 595. 1980; Mold., *Phytologia* 46: 466 & 483 (1980), 49: 452 (1981), 50: 252 (1982), and 51: 282. 1982.

Clarke's original (1885) description of this taxon is "leaves 3-foliolate glabrate, leaflets petioluled obovate shortly suddenly acuminate entire, panicles compound thinly cinereous-tomentose branches elongate, calyx 1/8 -- 1/16 in. oblong or suburceolate, corolla tomentose....A medium-sized tree (Maingay). Leaves (all the upper) 3-foliolate, a small leaflet rarely added; leaflets 5 by 2 1/4 in., obtuse, tip usually less than 1/4 in., with scattered white glands above and yellow beneath, petiolule of the middle leaflet often 1/2 in.; petiole 1--2 in., not winged. Panicles 8 by 5 in., terminal, penultimate sometimes added; cymes densely flowered clustered along the branches; bracts 1/8 in., linear, deciduous. Calyx minutely toothed at flower-time, much en-

larged, 1/2 in. diam. roundly 4-lobed in fruit. Corolla 1/4 -- 1/2 in., apiculate. This species differs from all the preceding by (inter alia) the large drupe. The inflorescence, calyx, corolla and drupe are so like those of *V. sumatrana* (Miq. Fl. Ind. Bat. Suppl. 567), that it may be a var. of it; but in *V. sumatrana* the leaves are mostly 5-foliolate and pubescent beneath." He cites as synonyms, *V. heterophylla* Schau., *V. loureirii* Wight, and *Vitex* n. 12 Hook. f. & Thoms., in herb. He cites Griffith 6064 and Maingay 1205 & 1207, from Malacca, as cotype collections.

Dunn & Tutchter (1912) cite *V. urceolata* from the Lienchow River, describing the corollas as "yellow", and found it in flower there in August. Parkinson (1922) records it from both North and South Andaman Islands. Fletcher (1938) cites Put 992 & 1507 from Thailand.

Dop (1928) cites Poilane 7450 & 7696 from Annam and Balansa 4885 and Bon 832, 1207, 1646, 1748, 6001, & 6202 from Tonkin, Vietnam. He comments that "Cette espèce me paraît avoir été souvent confondue avec le *V. quinata* Williams, avec lequel elle présente une ressemblance telle que Koorders et Valetton ont réuni les deux espèces. Cependant, il existe un caractère important très net sur lequel King et Gamble.....ainsi que Lam.....ont insisté: c'est que la corolle est entièrement glabre en dedans dans *V. sumatrana* et n'offre pas l'anneau de poils blancs que l'on observe dans presque tous les *Vitex* à l'insertion des étamines. J'ai pu m'assurer que la forme des folioles (non acuminées ou courtement et brisquement ou longuement acuminées) n'avait aucune valeur différentielle. J'ai la conviction que la plupart des plantes chinoises rapportées au *V. quinata* Williams appartiennent au *V. sumatrana* var. *urceolata*. Les échantillons récoltés à Hai nan par Henry (Herbier du Museum) appartiennent sans aucun doute à cette dernière espèce."

It seems most probable to me that *V. urceolata* will eventually be found to represent a species of *Teijsmanniodendron*, rather than *Vitex*.

Recent collectors describe this plant as a stocky tree, 25--75 feet tall, the trunk to 1 foot in diameter at breast height, the wood moderately soft, whitish, soon discoloring to a dirty-white, odorless and tasteless, the bark thick, grayish-white, finely checked, the branches numerous above the middle, forming a dense elongated crown, the twigs ascending, greenish-brown, with elongated lighter brown lenticels, the petioles green, ascending, the leaflets horizontally recurved, strongly conduplicate on the upper subcluid and darker-green surface, thickly coriaceous, the inflorescence erect, greenish, slightly fragrant, the corolla creamy-whitish (Elmer 11602), and the anthers purple-brown. They have found it growing in open grassland with fertile soil and in primary or virgin forests on red soil, at 3250 feet altitude, fruiting in November and December. They have recorded the vernacular name, "topas".

Material of this species has been misidentified and distributed in herbaria as *V. celebica* Koord., *V. glabrata* R. Br., *V. venosa* H. J. Lam, *V. pentaphylla* Merr., and *Teijsmanniodendron coriaceum* (C. B. Clarke) Kosterm.

Additional citations: BURMA: Karenni: Kurz 1047 (Mu--1793). Tenasserim: Helfer 6068 (Mu--1355). MALAYA: Malacca: Griffith 6064 (Ld--cotype, Mu--692--cotype). PHILIPPINE ISLANDS: Mindanao: Elmer 11602 (Bz--24120, N, Vt). GREATER SUNDA ISLANDS: Sumatra: Krukoff 4244 (Br, Br, Bz--25428, E--1107115), 4339 (Br, Br, Bz--25429, E--1113015); Yates 1609 (N).

VITEX VANSTEENISI Mold.

Additional citations: Mold., Phytologia 17: 241. 1968; Mold., Fifth Summ. 1: 329 (1971) and 2: 931. 1971; Mold., Phytol. Mem. 2: 319 & 595. 1980.

VITEX VAUTHIERI P. DC.

Additional bibliography: Buek, Gen. Spec. Syn. Candoll. 3: 502. 1858; H. N. & A. L. Mold., Pl. Life 2: 70 & 87. 1948; Mold., Phytologia 17: 241. 1968; Angely, Fl. Anal. Fitogeogr. Est. S. Paulo, ed. 1, 4: 829 & xix. 1971; Mold., Fifth Summ. 1: 180, 375, & 396 (1971) and 2: 614, 727, & 931. 1971; Mold., Phytol. Mem. 2: 172, 368, & 595. 1980; Mold., Phytologia 50: 248. 1982.

Recent collectors describe this plant as a common tree, sun-loving, to 5 m. tall, and have encountered it in capoeira, in flower in October, and in fruit in February and October. The corollas are said to have been "blue" on Murça Pires & Furtado 17330 and the fruit "rose" on Araujo & Maciel 4312.

It should be noted that the Angely publication, cited above, is usually cited as "1970" (the titlepage date), but was not actually published until 1971.

Material has been misidentified and distributed in some herbaria as *V. taruma* Mart.

Additional citations: BRAZIL: Mato Grosso: Murça Pires & Furtado 17330 (Ld). Rio de Janeiro: Araujo & Maciel 4312 [Herb. FEEMA 19195] (Ld). São Paulo: Puiggari 957 (P).

VITEX VELUTINA (Koord. & Val.) Koord.

Additional & emended bibliography: Koord., Exkursionsfl. 3: 137 & 495. 1912; E. D. Merr., Enum. Philip. Flow. Pl. 3: 398. 1923; Janssonius, Mikrogr. Holz. 754, 758, 761, 763, 764, 767, & 822--824. 1926; Heyne, Nutt. Plant. Ned. Ind., ed. 2, 1: 24 (1927) and ed. 2, 2: 1320. 1927; Janssonius, Key Java. Woods 54--55. 1952; Mold., Phytologia 17: 241. 1968; Mold., Fifth Summ. 1: 319 & 329 (1971) and 2: 718, 731, & 931. 1971; Mold., Phytol. Mem. 2: 309, 319, & 595. 1980; Mold., Phytologia 49: 454 & 455. 1981.

Heyne (1917) lists this plant only from Kambangan, where, he says, its wood is used in house construction. Janssonius (1926) gives a very detailed description of the wood anatomy, which he avers is very similar to that of *V. pinnata* L. He describes the plant as a tree to 20 m. tall, the trunk to 40 cm. in diameter and rather straight. "Bast mit grauer Aussenseite. Holz von den Eingeborenen für den Bau von Häusern nur wenig benutzt." In his 1952 work he notes: "The uni-seriate medullary rays numerous. The number of the vessels 5 to 15 to the mm. of the transverse section. Wood rather coarse-textured, not flexible, not tough, specif-

ic gravity 0.47."

Merrill (1923) says that this is "A Javan and Sumatran species to which H. Lam refers *F. B. 3059 Borden*, which is matched by *Whitford 1335* and *F. B. 25884 Alambra & Borrromeo*, all from Bataan Province, Luzon. This form has yellow flowers and appears to me to be more clearly allied to *Vitex turczaninowii* Merr. than to *V. heterophylla* Roxb. = *V. quinata* (Lour.) F. N. Will., which has blue flowers, and to which *V. velutina* Koord. is closely allied.

Additional citations" PHILIPPINE ISLANDS: Luzon: *Borden, Philip. Forest Bur. 3059* (Po--64777, W--850963).

VITEX VENULOSA Mold.

Additional bibliography: Mold., *Phytologia* 17: 241. 1968; Mold., *Fifth Summ.* 1: 232 (1971) and 2: 931. 1971; Mold., *Phytol. Mem.* 2: 222 & 595. 1980.

VITEX VERMOESENSI DeWild.

Additional bibliography: Fedde & Schust., *Justs Bot. Jahresber.* 57 (2): 404. 1938; Mold., *Phytologia* 17: 241. 1968; Mold., *Fifth Summ.* 1: 232 & 245 (1971) and 2: 931. 1971; Mold., *Phytol. Mem.* 2: 222, 235, & 595. 1980.

VITEX VERTICILLATA A. Chev.

Additional bibliography: Mold., *Phytologia* 17: 241--242. 1968; Mold., *Fifth Summ.* 1: 227 (1971) and 2: 931. 1971; Mold., *Phytol. Mem.* 2: 218 & 595. 1980.

VITEX VESTITA Wall.

Additional synonymy: *Vitex vestiat* Wall. ex Mold., *Fifth Summ.* 2: 731, in syn. 1971. *Vitex vestita* Griff. ex Mold., *Phytol. Mem.* 2: 460, in syn. 1980. *Vitex lanceifolia* Liu & Yu, *Act. Bot. Yun-nan.* 2: 455. 1980. *Vitex vestite* Wall. ex Mold., *Phytologia* 50: 267, in syn. 1982.

Additional & emended bibliography: Walp., *Repert. Bot. Syst.* 4: 85 & 91. 1845; Buek, *Gen. Spec. Syn. Candol.* 3: 502. 1858; Bocq. in *Baill., Rec. Obs. Bot.* 3: 253. 1863; Kurz, *Forest Fl. Brit. Burma* 2: 272--273 & 612. 1877; C. B. Clarke in *Hook. f., Fl. Brit. India* 4: 587 & 588. 1885; Collett & Hemsl., *Journ. Linn. Soc. Lond. Bot.* 28: 111. 1890; Briq. in *Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 172.* 1895; Greshoff, *Meded. Lands Plant.* 29: 126. 1900; Ridl., *Agric. Bull. Straits Fed. Mal. St.* 1: 219. 1902; Brandis, *Indian Trees, imp. 1, 505* (1906) and *imp. 3, 505.* 1911; W. W. Sm., *Notes Roy. Bot. Gard. Edinb.* 9: 141. 1916; H. Hallier, *Meded. Rijks Herb. Leid.* 37: 48 & 54. 1918; E. D. Merr., *Bibl. Enum. Born. Pl.* 515. 1921; Ridl., *Fl. Malay Penins.* 2: 635. 1923; Heyne, *Nutt. Plant. Ned. Ind., ed. 2, 1: 24* (1927) and *ed. 2, 2: 1320.* 1927; Dop, *Bull. Soc. Hist. Nat. Toulouse* 57: 207 & 211. 1928; Fedde & Schust., *Justs Bot. Jahresber.* 53 (1): 1077. 1932; Dop in *Lecomte, Fl. Gén. Indo-chine* 4: 839. 1935; Fletcher, *Kew Bull. Misc. Inf.* 1938: 405, 432, & 436. 1938; Kanjilal, Das, *Kanjilal, & De, Fl. Assam* 3: 458, 478--485, & 561. 1939; Corner, *Way-side Trees, ed. 2, 707 & 711.* 1952; Burkill, *Dict. Econ. Prod. Ma-*

lay Penins. 2: 2282. 1966; Mold., Phytologia 17: 242--243. 1968; Mold., Résumé Suppl. 17: 12. 1968; Brandis, Indian Trees, imp. 5, 505. 1971; Mold., Fifth Summ. 1: 279, 284, 291, 298, 303, 307, 309, 331, & 375 (1971) and 2: 717, 720, 722, 723, 731, & 931. 1971; Chan & Teo, Chem. Pharm. Bull. 20: 1582--1584. 1972; Farnsworth, Pharmacog. Titles 8 (1): xvii. 1973; Mold., Phytologia 28: 445 (1974) and 34: 20, 264, 266, & 280. 1976; Mold., Biol. Abstr. 65: 6769. 1978; Mold., Phytologia 38: 308 (1978) and 44: 486. 1979; Hocking, Excerpt. Bot. A.33: 86. 1979; Liu & Yu, Act. Bot. Yunnan 2: 455. 1980; Mold., Phytol. Mem. 2: 266, 274, 280, 288, 290, 294, 298, 319, 321, 368, 460, & 595. 1980; Mold., Phytologia 49: 182 (1981) and 50: 254, 267, & 270. 1982.

Kanjilal and his associates (1939) list this species from Assam. Burkill (1966) refers to it as "A small tree found from Burma to western Malaysia; in the [Malay] Peninsula it is found in the southern half and in Penang. The wood is white and not durable. It is used as fuel and for rafters." Greshoff (1900) avers that extracts from the plant are said to produce abortion, but he gives no details. Burkill states that the vernacular name, "bangas", is usually applied to *Memecylon* and "chichah" is applied to *Vitex velutina* "in confusion with *Whitfordiodendron*, &c." and "tampang besi" "in confusion with *Clerodendron*". He also thinks that the name, "kepayan", may be applied to *Vitex vestita* in error.

Miquel (1860) records the vernacular names, "madang-alahan" and "marambang". Collette & Hemsley (1890) list the species from the Shan Hills [Burma] at 4000 feet altitude, giving its overall distribution, as known to them, as "Burma to Malacca, Sumatra, Java, and Borneo". Williams (1905) cites Schmidt 294 & 434.

Heyne (1917) refers to the species as a tree, to 40 m. tall or more, "op het Maleische Schiereiland veelvuldig voorkomend. Het lichte, witachtig reekleurige hout wordt gebruikt voor daksparren en brandhout; het is veel minder in kwaliteit dan het van *V. pubescens*" Vahl.

Hallier (1918) cites Wallich 1750b from Penang, two unnumbered Korthals collections from Sumatra, and Beccari 1633 from Sarawak. As to its distribution, he says: "Murmah, nach Babel Halbinsel Malakka und Singapur. Das von Clarke behauptete Vorkommen auf Java ist zweifelhaft, da die von Dr. Ploem usw. gesammelten Exemplaren in Hb. L.-B. auch aus dem Hort. Bogor. stammen können." Dop (1928) cites only Wallich 1750, as well as Spire 462 from Laos. Fletcher (1938) cites, from Thailand, only Kerr 6238 and Schmidt 434, giving its distribution, as known to him, as Burma, China, Laos, and Penang.

Corner (1952) calls it the "common yellow vitex" and describes it as "A small tree like *V. gamosepala* but:-- Twigs, inflorescences and undersides of the leaves clothed with fine hairs: leaflets with 8--10 pairs of side-veins. Flowers rather smaller: calyx with 5 minute teeth"; listing it as only from Burma and western Malaysia, "frequent in Malaya".

Recent collectors describe *V. vestita* as a small or medium-sized

tree or treelet, 5--21 m. tall, or as a shrub or undershrub [or, according to Stone, a climbing vine], the bole often 12--25 feet high, the trunk crooked, often 8--15 cm. in diameter at breast height and a girth of 90 cm., the bark smooth or scaly, gray or grayish to grayish-brown, light-brown, or brown, often light-gray and brown mottled, the outer bark often green, the inner bark pale-gray or gray to almost white, sometimes yellowish to pale-orange, the sapwood white, pale-yellow, or yellowish to pale-orange, the twigs "covered with tomentum", the leaves 3--5-foliate, completely hairy or merely pubescent along the veins, covered with tiny golden scales between the veins, the petioles and secondaries covered with very fine, thin, brown hairs, the whole inflorescence softly pubescent, the inflorescence-axes greenish, covered with very fine, thin, brown hairs, pedicels green, the flowers 1/4 inch long, the calyx green or greenish, softly pubescent, the corollas bilabiate, softly pubescent, the anthers gray or with a dark-gray rim, the filaments yellow, the pistil white, and the immature fruit green or greenish to light-yellowish, maturing through yellowish-green and greenish-brown to black, berry-like, 1/4 inch in diameter. The corollas are said to have been "yellowish" on *Aban* SAN.93083, "greenish-yellow" on *Aban & Petrus* SAN.90667 and *Binideh* SAN.63163, "chrome-yellow" on *Banyang & Sibat* S.21522, "lemon-yellow" on *Clemens & Clemens* 29758a, "yellow" on *Charenphoel* & al. 1975, *Hardial* 343, *Ilias* & al. S. 34160, *Iwaksute* & al. M.13686, *Larsen & Larsen* 32697, *Maxwell* 77-13, *Mujin* SAN.18842, *Sinclair* 4785, *Syme* & al. 6667, and *Turnau* 886, "white" on *Larsen* & al. 31575, and "pale-rose" on *Kingdon-Ward* 17627.

Collectors have found this plant growing in both primary and secondary forests, in mixed dipterocarp and swamp forests, on gentle slopes covered with old secondary forests, on hillsides and forested rocky mountainsides, on ridges and sandstone ridgetops, in evergreen forests and open areas in them, in logged-over areas and disturbed ground, in red and sandy soils, along streams, trails, and roadsides, on riverbanks, in lowland areas, and on steep slopes in rich clay soil, as well as in riverine jungles and at the edges of marshes, from sealevel to 1800 m. altitude, in flower in January, February, April to June, and August to November, and in fruit from December to March, as well as from June to October. The additional vernacular name, "bóte-bóte", has been recorded.

Stone makes the remarkable statements (for his no. 6667) that the plant was a "vine, leaves trifoliate, flowers and inflorescence-axes dotted with tiny yellow glands, calyx 2-toothed, ovary conic, yellow, fruit purplish-black" and (for his no. 6157) "a climber, leaves pinnate, flowers yellow, tubular, bilabiate".

Clarke (1885) comments that the characters of the inflorescences of *V. vestita* clearly point to a close affinity with *V. gamosepala* W. Griff. in the Subgenus *Glossocalyx*.

Material of *V. vestita* has been misidentified and distributed in some herbaria as "*Rubiaceae*" and as *Evodia* sp. On the other hand, the *Sinclair* 9887, distributed as typical *V. vestita*, is re-

garded by me as the type collection of its var. *bracteata* Mold., while *Toroës* 4698 & 5230 are f. *glabrescens* Mold. (the former number being the type collection), *Maxwell* 73-232 is the type collection of f. *quinquefoliolata* Mold., and *Jong* 4517 is *V. longisepala* var. *longipes* Mold.

Additional citations: INDIA: East Punjab: *Kingdon-Ward* 17627 (N). THAILAND: *Charoenphol*, *Larsen*, & *Warncke* 3975 (Ac); *Larsen & Larsen* 32697 (Ac, Ld); *Larsen, Larsen, Nielsen, & Santisuk* 31575 (Ac); *Murata, Fukuoka, & Phengklaï* T.17428 (Ac), T.17429 (Ac), T.17473 (Ac). MALAYA: Johore: *Ahmad* S.351 (Kl--13085). Pahang: *Iwatsuki, Fukuoka, & Hutch* M.13686 (Ac); *Turnau* 886 (Kl--2885). Penang: *C. Curtis* 265 (Pd), 395 (Pd); *B. C. Stone* 6157 (Kl--5809); *Stone, Kam, & Beltran* 11696 (Kl--19390); *Wallich* 1750 (Pd), 1750b (Mu--1354, Pd). Selangor: *Nur* 34436 (W--2608302); *Poore* 1006 (Kl--6006), 1193 (Kl--6194); *Sider* 13197 (Ne--29777), s.n. [May 1969] (Ne--13716); *B. C. Stone* 6667 (Kl--6250). Singapore: *Cantley* 125 (Pd); *Hardial* 343 (N); *Maxwell* 77-13 (Ac); *Sinclair* 4785 (W--2913179). GREATER SUNDA ISLANDS: Sabah: *Aban SAN*.31162 (Ld), *SAN*.93038 (Ld); *Aban & Petrus SAN*.90667 (Ld); *Bidin SAN*.84805 (Ld); *Binideh SAN*.63163 (Sn); *Clemens & Clemens* 29758a (Mu); *Madani SAN*.92061 (Ld); *Mikil SAN*.31436 (Ld); *Mujin SAN*.18842 (Ld); *J. Singh SAN*.31115 (N); *Talib & Marsal SAN*.84840 (Ld). Sarawak: *Banying & Sibat* S.21522 (W--2902891); *Ilias & al.* S.34160 (Ac, Ld); *Mamit* s.n. [Herb. Sarawak Forest. Dept. S. 33435] (Ld). Sumatra: *Boeea* 7049 (W--1681965); *Krukoff* 319 (Mi, Mi, W--1702620), 4117 (W--1750545); *Toroës* 4238 (W--1681373), 4497 (W--1681385); *Yates* 2140 (Pd).

VITEX VESTITA var. *BRACTEATA* Mold., *Phytologia* 38: 308. 1978.

Bibliography: Mold., *Biol. Abstr.* 65: 6769. 1978; Mold., *Phytologia* 38: 308. 1978; *Hocking, Excerpt. Bot. A*.33: 86. 1979; Mold., *Phytol. Mem.* 2: 298 & 595. 1980.

Citations: MALAYA: Perak: *J. Sinclair* 9887 (Mu--isotype, N--type, W--29446132--isotype).

VITEX VESTITA f. *GLABRESCENS* Mold.

Additional bibliography: Mold., *Phytologia* 17: 243. 1968; Mold., *Fifth Summ.* 1: 329 (1971) and 2: 931. 1971; Mold., *Phytol. Mem.* 2: 319 & 595. 1980.

Toroës refers to this plant as a treelet. Material has been distributed in some herbaria as typical *V. vestita* Wall.

Additional citations: GREATER SUNDA ISLANDS: Sumatra: *Toroës* 4698 (W--1681007--isotype), 5230 (W--1681611).

VITEX VESTITA f. *MILLSII* (Henderson) Mold.

Additional bibliography: *Fedde & Schust., Justs Bot. Jahresber.* 59 (2): 417. 1939; Mold., *Phytologia* 17: 243. 1968; Mold., *Fifth Summ.* 1: 307 (1971) and 2: 931. 1971; Mold., *Phytologia* 34: 266. 1976; Mold., *Phytol. Mem.* 2: 298 & 595. 1980.

Recent collectors refer to this plant as a small tree and have found it growing along logging roads, at 1200 feet altitude,

fruiting in July.

Additional citations: MALAYA: Pahang: *Collector undetermined* 8082 (Kl--8082). Selangor: B. C. Stone 5879 (Kl--5593).

VITEX VESTITA f. *QUINQUEFOLIOLATA* Mold., *Phytologia* 34: 20. 1976.

Bibliography: Mold., *Phytologia* 34: 20 & 264. 1976; Mold., *Phytol. Mem.* 2: 288 & 595. 1980.

Citations: THAILAND: Maxwell 73-232 (Ac--type).

VITEX VESTITA var. *SIAMICA* Mold.

Additional bibliography: Mold., *Phytologia* 17: 243. 1968; Mold., *Fifth Summ.* 1: 298 (1971) and 2: 931. 1971; Mold., *Phytol. Mem.* 2: 288 & 595. 1980.

VITEX VESTITA f. *UNIFOLIOLATA* Mold., *Phytologia* 49: 182. 1981.

Bibliography: Mold., *Phytologia* 49: 182 (1981) and 50: 254 & 270. 1982.

The type locality of this taxon is on the track from Kampung Seldok northeast to the large blang south of the summit of Gunung Bandahara, about 25 km. north-northwest of Kutajane, at 1000 m. altitude. The collectors describe the plant as "scandent", to 8 m. long, the calyx brownish-green, the corolla whitish, and the young fruit subglobose, glossy-green, about 5 mm. in diameter, and have distributed it to herbaria misidentified as *Clerodendrum* sp.

Citations: GREATER SUNDA ISLANDS: Sumatra: DeWilde & DeWilde-Duyfjee 13415 (Ld--photo of type, W--2921051--type).

VITEX VESTITA f. *WINKLERI* Mold.

Additional bibliography: Mold., *Phytologia* 17: 243. 1968; Mold., *Fifth Summ.* 1: 329 (1971) and 2: 931. 1971; Mold., *Phytol. Mem.* 2: 319 & 595. 1980.

VITEX VILLOSA Sim.

Additional bibliography: Fedde & Schust., *Justs Bot. Jahresber.* 39 (2): 320. 1913; Mold., *Phytologia* 17: 243. 1968; Mold., *Fifth Summ.* 1: 253 (1971) and 2: 931. 1971; Mold., *Phytol. Mem.* 2: 242 & 595. 1980.

VITEX VOLKENSII Gürke

Additional & emended bibliography: J. G. Baker in Thiselt.-Dyer, *Fl. Trop. Afr.* 5: 315 & 318. 1900; Mold., *Phytologia* 17: 243--244. 1968; Mold., *Fifth Summ.* 1: 232, 239, & 242 (1971) and 2: 716, 718, & 931. 1971; Mold., *Phytol. Mem.* 2: 222, 228, 232, & 595. 1980; Mold., *Phytologia* 51: 281. 1982.

Baker (1900) cites only the type collection, *Volkens* 132. Schlieben refers to the plant as a shrub, 1--2 m. tall, with white corollas, and encountered it in open woods, at 300 m. altitude, flowering in January.

The Mearns 262 & 269, cited by me in *Phytologia* 6: 219 (1958) prove actually to represent *V. strickeri* Vatke & Hildebr. and not *V. volkensis*.

Additional citations: TANGANYIKA: *Schlieben* 5910 (Ld, Mu).

VITEX VONDROZENSIS Mold.

Additional bibliography: Mold., *Phytologia* 17: 244. 1968; Mold., *Fifth Summ.* 1: 264 (1971) and 2: 931. 1971; Mold., *Phytol. Mem.* 2: 252 & 595. 1980.

VITEX WATERLOTI Danguy

Additional bibliography: Mold., *Phytologia* 17: 244. 1968; Mold., *Fifth Summ.* 1: 264 (1971) and 2: 731 & 931. 1971; Mold., *Phytol. Mem.* 2: 252 & 595. 1980.

VITEX WELLENSI DeWild.

Additional bibliography: Mold., *Phytologia* 17: 244. 1968; Mold., *Fifth Summ.* 1: 232 (1971) and 2: 931. 1971; Mold., *Phytol. Mem.* 2: 222 & 595. 1980.

VITEX WELWITSCHII Gürke

Additional & emended bibliography: J. G. Baker in *Thiselt.-Dyer*, *Fl. Trop. Afr.* 5: 317 & 329. 1900; Irvine, *Pl. Gold Coast* 437. 1930; Fedde & Schust., *Justs Bot. Jahresber.* 57 (2): 403. 1938; H. N. & A. L. Mold., *Pl. Life* 2: 68 & 89. 1934; Mold., *Phytologia* 17: 244. 1968; Mold., *Biol. Abstr.* 50: 942. 1969; Hocking, *Excerpt. Bot. A.15*: 421. 1970; Mold., *Fifth Summ.* 1: 225, 232, 239, 245, 247, 249, & 253 (1971) and 2: 714, 720, 721, 728, & 931. 1971; Mold., *Phytol. Mem.* 2: 215, 222, 228, 235, 236, 238, 242, & 595. 1980.

Baker (1900) cites only the type collection, *Welwitsch* 5644, from Angola. Leeuwenberg refers to the plant as a shrub, 5 m. tall, the leaves thinly coriaceous, and the immature fruit nearly obovoid, to 3 x 2.5 cm. in size, apically apiculate, and encountered it at 515 m. altitude, in fruit in July. Louis found it in flower in October. The type specimen, in the British Museum herbarium, was photographed there by F. G. Meyer as his type photograph number

Additional citations: CAMEROONS: *Leeuwenberg* 6182 (E--2160139). ZAIRE: *Donis* 3307 (Mu); *Louis* 2321 (W--2090931), 6292 (N), (W--2091109). ANGOLA: *Welwitsch* 5644 [F. G. Mey. photo 2993] (Gz--photo of type, N--photo of type).

VITEX WELWITSCHII var. *LAURENTII* (DeWild.) Pieper

Additional bibliography: Prain, *Ind. Kew. Suppl.* 4, imp. 1, 248. 1913; A. W. Hill, *Ind. Kew. Suppl.* 7: 252. 1929; Fedde & Schust., *Justs Bot. Jahresber.* 57 (2): 403. 1938; Prain, *Ind. Kew. Suppl.* 4, imp. 2, 248. 1958; Mold., *Phytologia* 6: 223--224. 1958; Mold., *Résumé* 139, 143, 381, 385, & 479. 1959; Mold., *Fifth Summ.* 1: 225 & 232 (1971) and 2: 714, 720, & 931. 1971; Mold., *Phytol. Mem.* 2: 215, 222, & 595. 1980.

VITEX WILMSII Gürke

Additional bibliography: *Thiselt.-Dyer*, *Ind. Kew. Suppl.* 2: 194. 1904; Fedde & Schust., *Justs Bot. Jahresber.* 57 (2): 404. 1938;

Mold., *Phytologia* 6: 24 (1957) and 6: 224--227. 1958; Anon., U. S. Dept. Agr. Bot. Subj. Index 15: 14362. 1959; Mold., *Résumé* 152, 154, & 479. 1959; Mold., *Phytologia* 8: 94. 1961; Watt & Breyer-Brandwijk, *Med. Poison. Pl. S. Afr.*, ed. 2, 1055 & 1454. 1962; Compton, *Journ. S. Afr. Bot. Suppl.* 6: 66, 156, 177, & 178. 1966; Mold., *Résumé Suppl.* 16: 30. 1968; Van der Schijff, *Check List Vasc. Pl. Kruger Natl. Park* 81. 1969; Mold., *Fifth Summ.* 1: 253, 255, & 258 (1971) and 2: 727, 731, & 931. 1971; Palmer & Pitman, *Trees South. Afr.*, ed. 2, 3: 1951, 1960, & 1961. 1972; Gibson, *Wild Fls. Natal* 93. 1978; Mold., *Phytol. Mem.* 2: 242, 244, 247, & 595. 1980.

Additional illustrations: Palmer & Pitman, *Trees South. Afr.*, ed. 2, 3: 1960. 1972; Gibson, *Wild Fls. Natal* 92/93 (in color). 1978.

Palmer & Pitman (1972) provide an excellent description of this species, but include var. *reflexa* as a synonym: "It is a large deciduous shrub or small tree up to about 7.6 m high with densely hairy twigs and silvery and often hairy foliage. The leaves, composed of 3--5 leaflets arising from one point, are borne on robust, hairy stalks up to about 5 cm long. The leaflets are 2.5--11 cm long and 1.3--6 cm broad, egg-shaped, oval, or widely lance-shaped, the tips round or pointed, often with a short jutting point, the base tapered or sometimes rounded, the blade often rough to the touch, very hairy or smooth, with the midrib and veins frequently woolly below [the smoother form is var. *reflexa*], the margins usually but not always untoothed (those on coppice shoots scalloped) and often outlined with a fringe of fine hairs. The leaflets are stalkless or with very short stalks. The mauve or white flowers are borne in branching heads on long stalks in the axils of the leaves from about August to November. The small cone-shaped fruits are surrounded by the enlarged, 5-lobed calyx. They ripen from February to March. Zulus use the tree as a prophylactic when serious disease breaks out in a kraal. The specific name honours Dr Friedrich Wilms, 1848--1919, German apothecary, who set up a druggist business in Lydenburg in the Transvaal in 1883 and collected largely in that District.: They report the vernacular names, "ama-khosikati", "um luthu", and "Wilm's vitex", and report that "This is a species of the northern and eastern districts -- of the north eastern Transvaal, Natal and Swaziland, with one record from the Transkei -- growing in woodland, in bushveld, sometimes on the banks of streams and on high, rocky, exposed mountain sides, from altitudes of 600 to 1800 m." Gibson (1978) refers to it as "A beautiful tree". Van der Schijff (1969) records it from Kruger National Park on the basis of his no. 3964. Compton (1966) also avers that it is "a handsome plant". growing on hillsides in Swaziland and there called "emakhosikati".

Recent collectors describe it as a small tree, to 20 feet tall, or a "scandent shrub" [Edwards 3279], and have encountered it in scrub forest on white sand and "common" in short bushveld on rocky slopes, at 400--2000 feet altitude, in flower in November and in fruit in March.

[to be continued]

BOOK REVIEWS

Alma L. Moldenke

"DAWN OF MODERN SCIENCE" by Thomas Goldstein, xix & 297 pp., 57 b/w fig. & 3 maps. Houghton, Mifflin Company, Boston, Massachusetts 02108. 1980. \$12.95 hardcover & 1982 \$6.95 paper-cover.

Books - texts - on some phase of the history of science have usually been written by either some kind of scientists with a kind of flare for the pertinent history or by some kind of historians with a concomitant flare for the pertinent science. This humanist author has an evidently very alert mind, yet he "grew up with a profound distrust, not to say hostility, toward science and its modern twin, technology". (Shame on some early teacher(s) who did not show him the beauty in science content and methods which he found so readily in literature, art and philosophy!) Through their beginnings he became fascinated with their development mainly in medieval times. This author's text is spellbinding! It presents the idea of the earth in Renaissance Florence, its ancient roots, the school at Chartres, the influence of Islam, scholastics, mystics and alchemists, art and science in the Renaissance pivoting around Leonardo da Vinci, and an epilogue on the Tree of Knowledge. "To deprive science of the more intimidating aspects of its myth....might have a liberating effect on our thinking." The bibliographical notes, arranged by chapters, are valuable short essays in themselves.

"ROOT NODULES OF LEGUMES: Structure and Functions" by F. J. Bergersen, x & 164 pp., 25 b/w fig. incl. 10 photo & 15 tab. Research Studies Press of John Wiley & Sons Ltd., Chichester, Brisbane & New York, N. Y. 10198. 1982. \$31.95.

"Primarily a mechanism enabling survival of legumes in infertile environments or enabling successful growth when other plants compete strongly for available soil nitrogen," N_2 -fixation, ephemeral or perennial, in many, not all, legumes is accomplished by symbiotic *Rhizobium* species limitedly within soil, but more efficiently within the 5 main types of sheltering root-nodules. The seven chapters in this monograph cover the author's experimental work and study in 1954 and ends with a discussing of the role of leghaemoglobin. There are excellent TEM slide photos of nodule sections. There are also several excellent biochemical cycle diagrams with the last one displaying almost the whole story. The text is effectively explanatory of the newer techniques for nodule, bacteroid and host cell anatomy and properties such as electron transport to nitrogenase, energy-yielding metabolism and symbiotic functions.

"SYNTHETIC AND DEGRADATIVE PROCESSES IN MARINE MACROPHYTES"

edited by Lalit M. Srivastava, xiii & 296 pp., 70 b/w fig., 23 tab., 20 photo. & 8 maps. Walter de Gruyter-Verlag, Berlin 30 & Hawthorne, New York 10532. 1982.

This valuable text of 15 papers, opening remarks and recorded question-answer periods makes up the "Proceedings of a Conference held at Bamfield Marine Station, Bamfield, Vancouver Island, British Columbia, May 16--18, 1980" and covers these topics: strategies for growth and reproduction, nutrition and culture, marine macrophytes in coastal ecosystems, and polysaccharides -- kelp farming and harvesting. Kelp as a commercial source of potash was temporarily important during World War I and of agar during World War II. Now such "seaweeds are important sources of food, several phycocolloids, pharmaceuticals and, more recently, biomass for energy."

"BIOLOGICAL CONTROL OF WEEDS WITH PLANT PATHOGENS" edited by R.

Charudattan & H. L. Walker, xiv & 293 pp., 23 b/w fig., 33 tab. & 2 maps. Wiley-Interscience Publication of John Wiley & Sons, New York, N. Y. 10158. 1982. \$42.50.

"The management of diverse weed populations requires an integrated systems approach that employs chemical, cultural, mechanical, biological, ecological and bioenvironmental methods" with the use of plant pathogens (fungi, bacteria, viruses, phages, mycoplasmas) as quite new weapons against a "total loss of \$14 billion annually". There are 14 papers and 15 abstracts on current experimentation and problems. There is an index of weed and crop plants with their common and scientific names as well as one with the microorganism-pathogens and the nematode and arthropod carriers. This is a clearly written text important for plant pathology, weed science, agriculture and similar students and researchers.

"HERBICIDE RESISTANCE IN PLANTS" edited by Homer M. LeBaron &

Jonathan Gressel, xxix & 401 pp., 91 b/w fig., 10 photo., 60 tab. & 10 maps. A Wiley-Interscience Publication of John Wiley & Sons, New York, N. Y. 10158. 1982. \$48.00.

Many scientific workers and technicians will want this well organized, accurately and critically reported information based on carefully and succinctly recorded experiments with bibliographic material presented for further checking. Many advanced students in related studies will appreciate it, too! "To date, 30 common weed species in 18 genera.....previously susceptible to the triazine herbicides have been found to be resistant. There have been local and rather isolated occurrences of resistance or increased tolerance in various weed species to several other types of herbicides, including phenoxys (e.g., 2,4-D), trifluralin, paraquat, and

ureas (e.g., diuron)." Detailed tables give intraspecific differences in tolerance and/or resistance with herbicides listed first and again with the trial plants listed first. There is also a table listing the herbicides by common, trade, and chemical names and their manufacturers. The 18 papers comprising the text cover almost all phases of the topic and its experimental work very well.

"EXPERIMENTAL EMBRYOLOGY OF VASCULAR PLANTS" edited by B. M.

Johri, xvii & 273 pp., 81 b/w fig. incl. over 400 photo. & 7 tab. Springer-Verlag, Berlin, Heidelberg & New York, N. Y. 10010. 1982. \$48.00.

In the preface the editor states: "The totipotency of the plant cell, as envisaged by Haberlandt, at the beginning of the 20th century, has been fully vindicated. If, as yet we are not able to obtain the desired results in all instances, it is due to lack of proper techniques and insufficient knowledge about nutrient media and other physical and chemical conditions, which are essential for proper growth of cells, tissues and organs." Ten papers include the editor's introduction to those in vitro experiments mainly over the last 25 years, those on pteridophytes and gymnosperms and those on flower, anther, ovary, ovule, nucellus, endosperm, embryo and protoplast cultures. "The most spectacular achievements seem to be in vitro development of haploid plants from pollen." It is certainly fortunate that this book has been published, not in India, but in Germany by Springer.

"VEGETATION MITTELEUROPAS MIT DEN ALPEN in Ökologischer Sicht"

by Heinz Ellenberg, 989 pp., 499 b/w fig. & photo., 130 tab. & 31 maps. Verlag Eugen Ulmer, Pf. 700566, 7000 Stuttgart 70, West Germany. 1982. DM.120.

This is a most carefully prepared and richly detailed study that is copiously, effectively and variedly illustrated. It reveals its debt to the earlier meticulous work of European plant geographers, yet is up-to-date in its present day ecological concepts. It just has a fuller background for them than some few American ecologists who get so involved in mathematical formulae and graphs that they seem to forget to contrive to learn the identity, variation ranges and growing habits and associations of the plants (and animals, too) themselves. Use of this book is important for all serious workers in phytoecology and any of its subdivisions or branches. Fortunately the many legended illustrations and a German-English dictionary, as well as the use of the scientific botanical names involved, will help those whose earlier school days were freed from conjugating irregular German verbs.

"BIOSYNTHESE NIEDERMOLEKULARER NATURSTOFFE" by Horst Robert Schütte, 176 pp. & 150 fig., Gustav Fischer-Verlag, Pf. 176, 6900 Jena, West Germany. 1982. 30 M. locally, 36 M. foreign, paper-bound.

This is about the eighth treatise in the "Bausteine der Modernen Physiologie" series and it is planned as a short term or topical text for advanced students in biology, biochemistry, pharmacy, medicine and agriculture. The introduction explains replication of and evolution of these and related natural substances. The following chapters deal with the biosynthesis of the basic amino acids, porphyrines, pyrimidines, purines, cholesterol, phenylpropane substance exchange, glykosoids, alkaloids, etc. Because of the basic universality of chemical terms used in the chemical cycles and figures, students reading only English or other languages can still derive much from this book, as, of course, all German-speaking students can.

"LIFE IN DARWIN'S UNIVERSE -- Evolution and the Cosmos" by Gene Bylinsky, xiv & 238 pp., 51 b/w fig., 4 maps & 10 color fig. Doubleday & Company, Garden City, New York 11530. 1981. \$17.95.

This interesting account starts "in the beginning" with the "big bang" (What was before that?) and then surveys how the earth became suitable chemically and physically for life and how life evolved. Since the "stardust" of which all life has been made exists throughout the entire universe and is subject to the same laws of physics, chemistry, mathematics and evolution, intelligent life may be found on other habitable planets of comparable age. More distant prospective planets may now be studied by the newer radio astronomy. "The basic nonrepeatability of evolution argues against exact duplicates of humans existing anywhere else," but not for the grotesque products of the movies. This book should appeal to a wide range of inquisitive readers who will also appreciate the illustrations by Wayne McLoughlin. The final question in the text is important: "Is life on Earth intelligent enough not to wipe out the human race and most of the other life off the face of the Earth in the madness of a thermo-nuclear holocaust before discovering man's real worth and his place among the wonders of Darwin's universe."

"ANNUAL REVIEW OF PHYTOPATHOLOGY Volume 20" edited by Raymond G. Grogan with George A. Zentmyer & Ellis B. Cowling, xi & 467 pp., 28 b/w fig., 9 photo. & 5 tab. Annual Reviews Inc., Palo Alto, California 94306. 1982. \$22.00 U.S.A. and \$25.00 foreign.

The prefatory chapter is presented by Kenneth F. Baker and covers his worthwhile meditations on 50 years as an apolitical

plant pathologist. Interesting historical perspectives are given for DeBary, Duggar and Chupp. The 17 technical papers treat many modern problems such as satellite and satellite-like viruses or nucleic acids or RNA which are unable to multiply in cells without the assistance of a specific "helper" virus and have no sequence homology with the helper virus genome. They are associated with some diseases of different food crops. Other papers deal with genetics and epidemiological modeling of breakdown of plant disease resistance, X-ray microanalysis with electron optical equipment, the potential for biological control of plant diseases by saprophytic fungi on the leaf surface (=phyllosphere or phylloplane), abundant evidence of the ways in which agricultural practices facilitate the spread of viruses and their vectors, closed system agriculture, and the advances of the science of plant protection in the People's Republic of China. And there is much more. Advanced phytopathology students and scientists really need to be aware of all the information that is contained in this fine series of books.

"ENVIRONMENT AND PLANT ECOLOGY" Second Edition by John R. Etherington, xxii + 487 pp., 149 b/w fig., 34 tab., & 3 maps.
John Wiley & Sons, Inc., New York, N. Y. 10158. 1982.
\$59.95.

This is an excellent phytoecology text for undergraduate majors and graduate students with this and/or related specializations, in part because its parental first edition of 1975 was itself outstanding and also because it has been modernized effectively with the same clarity of presentation and explanation. It has a chapter added on waterlogged soils contributed by W. Armstrong. There are charts, tables and figures galore and of excellent format for presenting important ideas and scientific research results — some of the best I have ever seen, but there is not a plant or a plant setting shown in the whole book. Somehow or other, that makes me feel uncomfortably deprived.

"DISCOVERY: The Search for DNA's Secrets" by Mahlon Hoagland, xiv + 198 pp., 53 fig. & 2 tab. Houghton Mifflin Company, Boston, Massachusetts 02107. 1981. \$10.95.

This effectively organized account of molecular genetics and of its scientists as people as well as researchers makes for very good reading. The author is recognized as one of the contributors to these studies involving gene, enzyme, sexual bacteria, genetic recombination, double helix, RNA, etc. Incidentally these discoveries "have solidly established the Darwinian view of evolution" since all living creatures have "proteins made of the same 20 amino acids, all DNAs and RNAs are made of the same 4 bases, and all use the same genetic code and the same machinery for translating the instructions of DNA into protein."

947
52

LIBRARY

PHYTOLOGIA

An international journal to expedite botanical and phytogeographical publication

DEC 23 1982

NEW YORK

Vol. 52

(1) December 1982

No. 4

BOTANICAL GARDEN

CONTENTS

- OSORIO, H. S., *Contribution to the lichen flora of Uruguay.*
XVII. The scientific name of the "yerba de la
piedra" 217
- MORAN, R., *Berberis claireae*, a new species from Baja
California; and why not Mahonia 221
- GÓMEZ P., L. D., & GÓMEZ-L., J., *Plantae mesoamericanae*
novae. VII 227
- D'ARCY, W. G., *Jaltomata werffii: a correction* 230
- MOLDENKE, H. N., *Notes on new and noteworthy*
plants. CLXII 230
- MOLDENKE, H. N., *Additional notes on the genus*
Amasonia. IX 232
- MOLDENKE, H. N., *Additional notes on the genus Aegiphila.*
XXX 237
- TURNER, B. L., *A new species of Brickellia (Asteraceae) from*
northcentral Mexico 252
- KRESS, A., *Eine "neue" Androsace-Art: Androsace studiosorum*
A. Kress, spec. nov. (Androsace primuloides) 255
- KRESS, A., *Zur Nomenklatur der Androsace carnea Auct* 256
- CHIA, L.-C., FUNG, H.-L., & BUT, P. P.-H., *Some name-*
changes for hedge bamboos 257
- HOCKING, G. M., *Book reviews* 261

Published by Harold N. Moldenke and Alma L. Moldenke

303 Parkside Road
Plainfield, New Jersey 07060
U.S.A.

Price of this number \$3.00; for this volume \$13.00 in advance or \$14.00 after close of the volume; \$5.00 extra to all foreign addresses and domestic dealers; 512 pages constitute a complete volume; claims for numbers lost in the mails must be made immediately after receipt of the next following number for free replacement; back volume prices apply if payment is received after a volume is closed.



CONTRIBUTION TO THE LICHEN FLORA OF URUGUAY XVII.
The scientific name of the "Yerba de la Piedra".

Héctor S. Osorio.

Departamento de Botanica, Museo Nacional de
Historia Natural, Casilla de Correo 399,
Montevideo, URUGUAY.

The only lichen species occurring in Uruguay which possess a vernacular name is a saxicolous Usnea known as "Yerba de la Piedra" (Stone Grass). The first literature record known by the author belong to Arechavaleta (1894) and the scientific name given is Usnea barbata. In this paper a list of lichen species identified by Muller Argau is added but the varieties of Usnea barbata quoted: U. b. var. aspera Müll. Arg. and U. b. var. striqosa Kremp. are reported as growing on bark. There is no doubt that J. Arechavaleta misinterpreted this species.

In his work "La Vegetacion Uruguaya" Berro (1901) identified the "Yerba de la Piedra" as Usnea hieronymi Kremp. and listed some medical uses. He also indicated that this lichen is largely distributed in the country. As the author pointed out in a recent paper (Osorio 1981) in the lichen collection of M. Berro deposited at MVM the species Usnea hieronymi is not represented. The saxicolous Usneae which integrate this collection are: Usnea amblyoclada (two collections) and Usnea densirostra (five collections).

In his "Florula Uruguayensis" Herter (1933) also named the Yerba de la Piedra as Usnea hieronymi Kremp. which is issued in his "Plantae Uruguayenses Exsiccatae" under the number 318 and its distributional area extends through the whole country. In two subsequent papers (Herter 1933a, 1936) additional quotations of this species can be found. In a later paper (Herter 1943) deleted Usnea hieronymi from our flora and the name of Usnea densirostra Tayl. is applied to this species for the first time. The number 318 of the Exsiccata is also identified with the new name. After the revision of some collections identified as Usnea hieronymi and based on the study of a large number of saxicolous Usneae the author also concluded that this is the correct name for the "Yerba de la Piedra".

In spite of the nomenclatural correction made by Herter in some succeeding papers the name of Usnea hieronymi was frequently misapplied to the "Yerba de la Piedra" (Chebataroff 1944, Arrillaga de Maffei 1969, Koch de Brots et al. 1981).

In the Lichen Herbarium of the Museo Botanico de Montevideo (at present deposited at MVM) four collections named Usnea hieronymi can be found. The revision of these specimens proved that they can be referred to Usnea densirostra or Usnea amblyoclada as follows:

- URUGUAY: Maldonado, 1926, alt. 200 m., Herter Plantae Uruguayenses no. 318. Redetermined as Usnea amblyoclada (Müll. Arg.) Mot. A sample of this number preserved in Farlow Herbarium was identified by Motyka (1936/38 pg. 318) as Usnea densirostra Tayl.
- " Maldonado: Cerro del Toro, IV.1926, collector unknown, Mus. Bot. Montevicens. nr. 2597. Redetermined as Usnea densirostra Tayl.
- " Maldonado: Cerro Pan de Azucar, VIII.1928, Lombardo s.n., Redetermined as Usnea amblyoclada (Müll. Arg.) Mot.
- " Maldonado: Cerro Pan de Azucar, IX.1932, collector unknown, Mus. Bot. Montevicens. no. 7102. This collection is a mixture of Usnea densirostra Tayl. and Usnea amblyoclada (Müll. Arg.) Mot.

Summing up the knowledge that exists of the three saxicolous Usneae involved in the present question is as follows:

Usnea hieronymi Kremp.: its occurrence in Uruguay is reduced to a single collection made by Arechavaleta in the last century and published by Motyka (1936/38 pg. 649).

Usnea amblyoclada (Müll. Arg.) Mot.: is very scarcely collected in our country according with the literature records (Motyka 1936/38, Osorio 1980 & 1981) and with the herbarium specimens below listed.

Usnea densirostra Tayl.: is the most accurate name for the "Yerba de la Piedra". Within the saxicolous species of the genus Usnea in Uruguay this is the most commonly gathered as shows the below listed collections from MVM and the private herbarium of the author.

SPECIMENS EXAMINED:

Usnea amblyoclada (Müll. Arg.) Mot.

FLORIDA: Cerro Colorado, De Mata 67 (Herb. Osorio).

MALDONADO: Cerro Pan de Azucar, Osorio 857; Sierra de de las Animas, Cañada Totora, Osorio 5202.

Usnea densirostra Tayl.

CERRO LARGO: Arroyo La Tigra, Marchesi & Del Puerto 2.III.1972 (MVM).

DURAZNO: El Cordobes, Estancia Las Pitangas, El Prado, Osorio 2928.

- LAVALLEJA: Abra de Cotto, Osorio 6461; Arroyo Aguas Blancas and Hwy. 8, Legrand VII.1960 (MVM); Cerro Arequita, vid. Motyka, Osorio 2062; Cerro Penitente det. Motyka, Osorio 3289, 3291; Minas, Parque de Vacaciones de UTE, Osorio 4931; Villa Serrana, det. Motyka, Osorio 2029; 15 km SSW from Aigua, Achaval 6/8.VI.1973 (MVM).
- MALDONADO: Abra de Castellanos, Osorio 6542; Abra de Perdomo, Osorio 1897, Philippi 28.VII.1968 (MVM); Cerro Pan de Azucar, San Martin 21.VIII.1960 (MVM); Piriapolis, Cerro del Toro, Osorio 4596; Punta Ballena, Parque Lussich, Osorio 4606, 4609; Punta Colorada, vid. Motyka, Osorio 1852; Sierra de las Animas, Femenias VII.1981 (MVM).
- MONTEVIDEO: Carrasco, Cañada de las Canteras, Osorio 2652.
- ROCHA: Cerro del Negro (near Arroyo Valizas), Baeza 20.I.1973 (MVM); Castillos, Cerro de los Rocha, Osorio 5633; Hwy. 16, Cerro Aspero, Osorio 572; San Miguel, Cerro Picudo, Gortari 29.IV.1972 (MVM).
- SAN JOSE: Sierra Mahoma, Martinez Machiavello, 1.I.1955 (MVM).
- TREINTA Y TRES: Quebrada de los Cuervos, Osorio 5970.

SUMMARY.

The saxicolous Usnea with the vernacular name of "Yerba de la Piedra" (Stone Grass) is erroneously identified as Usnea hieronymi Kremp. in several publications and herbarium specimens. The accurate name for this plant is Usnea densirostra Tayl.

LITERATURE CITED.

- ARECHAVALETA, J. 1894.
Contribución al conocimiento de los líquenes uruguayos.
Anales del Museo Nacional de Montevideo I: 173-186.
- ARRILLAGA DE MAFFEI, B. 1969.
Plantas Medicinales.
Serie Nuestra Tierra No. 31: 1-60.
Edit. Nuestra Tierra, Montevideo, Uruguay.
- BERRO, M. B. 1901.
La Vegetación Uruguaya. Plantas que se hacen distinguir por alguna propiedad útil o perjudicial.
Anales del Museo Nacional de Montevideo II: 89-196.
- CHEBATAROFF, J. 1944.
La Sierra Mahoma.
Boletín Sección Investigaciones Botánicas, Instituto de

Estudios Superiores, Montevideo, 1(1): 1-112.

HERTER, G. 1933.

Florula Uruguayensis. Plantae Avasculares.

Ostenia. Colección de trabajos botánicos dedicados a Don Cornelio Osten, pgs. 7-84.

Imp. Germano Uruguay, Montevideo, Uruguay.

HERTER, G. 1933a.

Apuntes sobre la flora del Palmar de Castillos, Departamento de Rocha, República Oriental del Uruguay.

Ostenia. Colección de trabajos botánicos dedicados a Don Cornelio Osten, pgs. 193-204.

Imp. Germano Uruguay, Montevideo, Uruguay.

HERTER, G. 1943.

Plantae uruguayenses novae vel criticae. Pars IV.

Revista Sudamericana de Botánica 7: 171-260.

HERTER, G. & F. ROSA MATO. 1936.

Excursión botánica al cerro mas alto del Uruguay.

Revista Sudamericana de Botánica 3: 1-7.

KOCH DE BROTONS, L., C. BOASSO, O. RICCIO DE MACHADO, C. GANDOLFO ANTUNEZ. 1981.

Enfermedades de las plantas, hongos superiores y saprófitas del Uruguay.

Informe Técnico No. 9 pgs. 1-140.

Ministerio de Agricultura y Pesca, Dirección de Sanidad Vegetal, Montevideo Uruguay.

MOTYKA, J. 1938/38.

Lichenum generis Usnea studium monographicum. Pars Systematica. Vol. I & II, 651 pgs., Leopoli.

OSORIO, H. S. 1980.

Contribution to the lichen flora of Uruguay. XIII. Lichens from Sierra Mahoma, San José Department.

Phytologia 45; 217-220.

OSORIO, H. S. 1981.

Contribution to the lichen flora of Uruguay. XVI. Lichens collected by Mariano B. Berro.

PHYTOLOGIA 47; 393-396.

BERBERIS CLAIREAE, A NEW SPECIES FROM BAJA CALIFORNIA;
AND WHY NOT MAHONIA

Reid Moran

Natural History Museum, San Diego, California 92112

Two species of Berberis section Mahonia have been known from Baja California: *B. higginsiae* Munz and *B. pinnata* Lag.; and a new species quite different from these is made known below.

Berberis higginsiae is very close to *B. haematocarpa* Woot. and perhaps not distinct and is also close to *B. fremontii* Torr. Marroquín (1972) cited specimens of all three species from northern Baja California but without distinct ranges and sometimes two species from one locality. Although Benson and Darrow (1981) did not list *B. higginsiae* in the synonymy of *B. fremontii*, they did ascribe *B. fremontii* to Baja California and map it in southern San Diego County, in the type region of *B. higginsiae*. This complex clearly needs study. Baja Californian specimens are variable in leaf form and mostly lack the fruit that is supposed to help distinguish these species; but I tentatively call them all *B. higginsiae*. Under this view, *B. higginsiae* is common in the Sierra Juárez and less common on the west slope of the Sierra San Pedro Mártir, extending from 675 m near Ojos Negros to 1900 m at the summit of Cerro Chato. It grows most commonly with *Juniperus californica* Carr, often also with *Pinus quadrifolia* Parl., and sometimes with *P. jeffreyi* Grev. & Balf. Also, it is rare and doubtless relictual 175 km to the SSE, in the Sierra San Borja (Rancho Viejo, Brandegge in 1889; Tinajas de la Chona, 800 m, Moran 12825).

According to Wiggins (1980:562), *B. pinnata* is occasional in the northern Sierra Juárez. The only Baja Californian collection I have seen, and the only one cited by Marroquín (1972), was made by Wiggins and Demaree (3995) in 1929 in a small box canyon with *Xylococcus*, *Rubus*, and *Plantanus*, 36 km north of Ensenada. From notes kindly sent by Dr. Wiggins and from labels on other collections, the place seems to be about 3 km SE of Rancho Jatay [or Guatay], where the road of that day climbed inland from the coast and started across the mesa towards Ensenada.

Berberis piperiana (Abrams) McMinn, as usually understood, grows in the coast ranges of northern California and southern Oregon. Munz (1959:107) reported it also as less common from the San Gabriel Mountains to San Diego County and Baja California; but later (1974:245) he omitted it from the flora of southern California, perhaps referring the southern specimens to *B. pinnata*. This complex also clearly needs study. Wiggins (1980:562) reported *B. piperiana* as rare in northern Baja California, at 900-1700 m. I have seen no Baja Californian specimens from this complex except for the one mentioned under *B. pinnata*; and Marroquín (1972) cited no other.

A third species of *Berberis*, described here as *B. claireae*, grows in a few canyons near the coast some 50 km south of Ensenada, below Eréndira. Fred Sproul brought this plant to my attention with a sterile

specimen collected in December 1977. I later found a sterile specimen (POM) collected in April 1925 by Marion Hill, a student at Pomona College. I have pursued this plant over the last four years.

Berberis or Mahonia?

Authors disagree whether to include Mahonia in Berberis or keep it a separate genus. In considering this question, Ernst (1964) pointed out that the two groups have much in common, including chromosome number, similar and somewhat unusual pollen, and susceptibility to wheat rust; and Ahrendt (1961) argued that no distinction can be made in petals or stamens, as some have tried to do. *Berberis* (*Mahonia*) *aquifolium* forms sterile hybrids with several species of *Berberis* *s.s.* Ahrendt and Ernst both wrote that *Mahonia* seems to differ consistently from *Berberis* *s.s.* only in having compound leaves. That way the distinction between them is simple and unequivocal, but is it natural? The leaves of *Berberis* *s.s.* are jointed at the base, much as the leaflets of *Mahonia* are jointed to the rachis and as the rachis itself is often jointed; and in one or more species of *Berberis* *s.s.*, according to Ernst, the leaf is twice jointed. It thus appears that the simple leaf of *Berberis* *s.s.* is derived from the pinnate leaf of *Mahonia*. Is it certain that *Berberis*, separated only by simple leaves, is monophyletic?

The primary leaves in most species of *Berberis* *s.s.* are reduced to simple or branching spines and in a few others are transitional between leaves and spines; and the foliage leaves are crowded on axillary short shoots. Thus the character of simple leaves in *Berberis* *s.s.* usually is supported by the presence of spiniform primary leaves and of short shoots. However, at least *B. insignis* Hook f. & Thomps. and relatives, of the eastern Himalaya, have simple primary leaves and no spines or short shoots. The leaves are pinnately veined as in *Berberis* *s.s.* and like the leaflets of most American species of *Mahonia* but unlike those of (most?) Asian species. The question is whether these plants can be simple-leaved members of *Mahonia*, spoiling the one key character of a one-character genus? Or are they best called a third group more or less coordinate with the other two? Thus the distinction of *Mahonia* from *Berberis* remains unclear. Shifting species from one group to the other may perhaps make the groups more natural if less easily defined. For the present, however, *Mahonia* is hard to defend as a distinct natural group, and I prefer to keep it in *Berberis*.

Berberis claireae Moran, species nova.

Frutex glaber rhizomatosus 1 - 1.5 m altus, caule 1 - 3 cm crasso, ramulis hornotinis foliorumque rhachidibus muriculatis rubris. Folia 3 - 10 cm longa, foliolis plerumque 1 - vel 2 - jugis ellipticis apice vulgo obtusis 2 - 3-plo longioribus quam latioribus coriaceis minute papillosis 2 - 6 cm longis 8 - 20 (-33) mm latis utroque latere 0 - 6 - spinoso-dentatis, nervibus e basi 3 - 5 subparallelis. Inflorescentia terminalis 2 - 8 cm longa 2 - 5 cm lata paniculata vel racemo reducta 5 - 50 florata, pedicellis gracilis 3 - 12 mm longis. Flores 5 - 7 mm lati necessario flavi. Sepala 9 vel 12, interioribus obovatis

4 - 5 mm longis. Petala 6 obovata 3 - 4 mm longa basi biglandulosa, glandibus nervalibus 0.5 - 1.0 mm longis. Stamina 6 dentata 1 - 1.5 mm longa. Pistillum breve stipitatum 1.5 - 2.0 mm longum, stigmatem 1 mm lato, ovulis 2. Bacca glauca ca. 5 mm longa et 4 mm crassa. Holotypus: Moran 30011 (SD 110283). Inter species turmae Occidentali in America occidentali nervatura palmata foliolorum suorum statim dignoscenda est. In hoc signo *B. gracili* similis est, sed foliolibus paucioribus (etiam solitariis) angustioribus magisque coriaceis, pedicellis longioribus, styliis brevioribus, fructibus parvioribus, seminibus tantum duobus differt.

Stiff glabrous rhizomatous shrub 8 - 16 dm tall, usually crowded and then with narrow crown and few lower branches. Stems erect, solitary or few-branched from base, 1 - 2 (-3) cm thick, the bark smoothish, light gray; twigs terete, muriculate, dark red, in age gray. Rhizomes often 1 dm below ground, to 1 m or more long, at first light yellow and 1.5 - 3 mm thick, later brown and 3 - 5 mm thick, the internodes ca. 5 - 15 mm long, each node at first with thin brownish triangular scale 4 - 5 mm long. Bud scales triangular, 2 - 5 mm long, 2 - 4 mm wide, dark red. Leaves 3 - 7 (-10) cm long, 2 - 6 (-10) cm wide, commonly 3- or 5-foliolate sometimes 1- to 7-foliolate; petiole and rachis bright red becoming dark, muriculate, sometimes persisting after fall of leaflets, the petiole 2 - 10 (-27) mm long, ca. 0.5 mm thick, broadened to sheathing triangular base ca. 2 - 4 mm wide with thin margins bearing stipular cusps to 1 mm long; leaflets sessile, conspicuously jointed to rachis, coriaceous, at first often red but soon deep green, somewhat lustrous, paler beneath, minutely low-papillose especially dorsally, nearly plane or slightly convex dorsally, mostly elliptic, ca. 2 - 3 times longer than wide, obtuse to broadly acute at base and apex, spinose tipped, 2 - 4 (-6) cm long, 8 - 20 (-33) mm wide, the terminal one usually largest, the margins thickened, colorless, slightly revolute, entire or mostly with 1 - 6 ascending to spreading slender but strong acicular teeth 0.5 - 3 mm long, slightly convex to slightly incurved between teeth, the main veins 3 or 5 from base, subequal, subparallel, often flexuous, slightly projecting ventrally. Inflorescence 2 - 5 (-8) cm long, 2 - 5 cm wide, a sessile terminal panicle with sometimes several spreading racemose or compound branches and up to 50 or more flowers, or reduced to simple raceme with as few as 5 flowers; primary bracts deciduous by anthesis. Pedicels 3 - 12 mm long, ca. 0.3 mm thick, tipped with persistent discate receptacle ca. 1 mm wide, with pair of small acuminate bracteoles near middle or below. Flowers mostly February to April, a few to June, bright yellow, ca. 5 - 7 mm wide. Sepals 9 or 12, the outer ovate to suborbicular, broadly acute to rounded, 1.5 - 2 mm long, the inner obovate, cupped, 4 - 5 mm long, 2.5 - 3 mm wide, 3-veined. Petals 6, obovate, cupped, rounded to emarginate, 3 - 4 mm long, 1.5 - 2 mm wide, 3-veined, with glands ca. 0.5 - 1.0 mm long and a third as wide along lower part of outer veins and so on either side of filament. Stamens 6, epipetalous, 1.5 - 2.5 mm long, the anther ca. 1 mm long, truncate above, with tooth on each side below. Pistil ovoid, short stipitate, 1.5 - 2 mm long, the capitate stigma sessile, 1 mm wide, the ovules 2. Berries few per inflorescence, to 5 mm long and 4 mm thick, glaucous, yellowish green becoming reddish but not

seen fully ripe; in October shriveled, hard, brown.

Type Collection: Common on south arroyo bank and lower north-facing slope, Arroyo Hediondo 1.5 km from the mouth, 50 m elevation, 5 km SE of Eréndira, Baja California Norte, Mexico (near 30° 14.3'N, 116° 20.4 'W), 7 March 1982, Moran 30011 (Holotype: SD 110283; isotypes to go).

Distribution: Baja California Norte: Known only from canyons between 5 and 20 km + SE of Eréndira and within 5 km of the coast, at elevations of 25 - 75 m. Collections (SD unless otherwise noted): Arroyo Hediondo, 50 - 75 m, M28150, 28669, 30014; 0.5 km SSE of Peñasco la Lobera, 30 m, (M26553, 26591, 27159, 27639, 28028); 2 km W of Cerro Solo, 50 m, Sproul 237, M27161, 27166; 2.5 km S of Cerro Solo, 30 m, M27191; Arroyo San Antonio and tributaries, 25 - 50 m, M27618, 27637, 30051, 30056; San Antonio Canyon, "500 ft.", M. Hill 127 (POM).

This species is named for Claire Brey, who greatly helped in exploring for it.

Despite some searching in likely areas both north and south, I have thus far found *B. claireae* only in a few canyons from Arroyo Hediondo, 5 km SE of Eréndira, to Arroyo San Antonio above Rancho San Antonio del Mar (Johnson Ranch) - a span of 15 km. It grows best at the foot of north slopes in the larger of these small canyons, more commonly where the south canyon wall is higher or steeper. It is not found in the more xeric vegetation of south-facing slopes or on the north bank of the arroyo. Just back from the south bank it may be rather common in a fairly dense low scrub, especially with *Rhamnus insula* Kell., *Ribes viburnifolium* A. Gray, *Rhus integrifolia* (Nutt.) Brew. & Wats., and *Heteromeles arbutifolia* (Lindl.) M. Roem. Smaller plants sometimes grow higher on the slope. Less constant and sometimes less intimate associates include *Adenothamnus validus* (Brandege) Keck, *Aesculus parryi* A. Gray, *Agave shawii* Engelm. *Artemisia californica* Less., *Ceanothus thyrsiflorus* Esch., *C. verrucosus* Nutt., *Cercocarpus minutiflorus* Abrams, *Cneoridium dumosum* (Nutt.) Hook. f., *Comarostaphylos diversifolia* (Parry) Greene, *Coreopsis maritima* (Nutt.) Hook., *Diplacus puniceus* Nutt., *Dudleya ingens* Rose, *Eriogonum fasciculatum* Nutt., *Eriophyllum confertiflorum* (DC.) A. Gray, *Galvezia juncea* (Benth.) Ball, *Lotus scoparius* (Nutt.) Ottley, *Malosma laurina* Nutt., *Pinus muricata* D. Don (especially forma *remorata* (Mason) Hoover), *Rosa minutifolia* Engelm., *Salvia brandegei* Munz, *S. munzii* Epl., *Simmondsia chinensis* (Link) Schneid., *Venegasia carpesoides* DC., and *Xylococcus bicolor* Nutt.

The limited range, in mesic habitats along the coast, suggests that *Berberis claireae* may be a relict retreating with the warming and drying of the climate. I sent a leaf to Dr. Daniel Axelrod to see if it resembled any species he knew as a fossil; but he said no, he had nothing like it in his rather extensive collection of the genus. In Arroyo Hediondo it grows with *Pinus muricata* [especially forma *remorata*], which is local in Baja California more than 400 km southeast of its next most southern populations on Santa Cruz and Santa Rosa Islands. Also here is *Ceanothus thyrsiflorus*, even more

local in Baja California and over 500 km southeast of other populations: otherwise, it occurs in the coast ranges from Santa Barbara Co. to Oregon. According to Chaney and Mason (1954) it is locally more abundant in the discontinuous closed-cone pine forest, and it was with *Pinus remorata* in the Pleistocene flora of Santa Cruz Island. Two other associates of the berberis are confined to coastal northern Baja California (and the first on Isla Cedros) except for more northern occurrences on islands: *Ribes viburnifolium* on Santa Catalina Island and *Salvia brandegei* on Santa Rosa Island. Another relict in Arroyo Hediondo is *Adenothamnus validus*, a rare endemic monotype of coastal northwest Baja California.

Ahrendt (1961) divided *Mahonia* into two groups, four sections, and 15 subsections, with a total of 110 species. (I am unable to evaluate this classification.) Treating the American (and especially the Mexican) species of *Mahonia*, but under *Berberis*, Marroquín (1972) accepted Ahrendt's American subdivisions of *Mahonia* without formally transferring them to *Berberis*. Ahrendt's two groups are (1) the Orientales, of Asia except for *M. nervosa* Pursh in western North America, and (2) the Occidentales, of western North America to Costa Rica. He separated the Orientales chiefly by the long and persistent bud-scales; and on this basis *B. claireae* clearly falls in the Occidentales.

Ahrendt (1961:331), and following him Marroquín, divided the group Occidentales into three sections. From their keys *B. claireae* falls in section Aquifoliatae, of British Columbia to Guatemala; and it agrees in the main with the descriptions. However, it does not agree with any species described.

A striking character of *B. claireae* is the palmate leaflet venation, with 3 or 5 subparallel and nearly equal veins from the base. In other west American species of Occidentales, venation is pinnate - or at most in broader leaflets sometimes varies to subpalmate, with smaller and shorter lateral veins from the base. Venation is palmate also in *B. nervosa* Pursh of central California to British Columbia, the sole American survivor of the group Orientales. That differs sharply from other American species in its large and persistent glumaceous bud scales. It differs from *B. claireae* further in many ways, having larger racemes, flowers, and fruits, and larger leaves with longer petioles and with 7 - 21 larger and more widely spaced leaflets.

Thus, *B. claireae* differs from all other west American species of Occidentales in its leaf venation. To judge from Ahrendt's numbers, which are incomplete but suggestive, it differs from them further in having only two ovules per ovary instead of 3 - 18.

It is hard to place *B. claireae* within the Occidentales. The most similar leaflet venation I have found is in *B. gracilis* Hartw. (subsection Schiedeanae), of northeastern Mexico: the leaflets there are more variable but sometimes are palmately 3 - 5-veined from the base. The leaves are somewhat thinner and are glabrous instead of papillose. As described by Ahrendt (1961:343), the leaves of *B. gracilis* have 2 - 6 pairs of leaflets, the lowest 2 - 4 cm above the

base; leaflets are ovate, 3.5 - 5 cm long, 1.5 - 3 cm wide, with margins 10 - 12-spinose-serrate; racemes are 1 - 3, fascicled, dense, suberect, 3 - 8 cm long; pedicels are 1 - 3 mm long, or to 4 mm in fruit; ovules are (3-) 4 - 5; and berries are 10 - 12 mm long, 5.5 - 7 mm thick, with styles 1 - 1.5 mm long. Thus the plant is quite different.

Dr. Michael Donoghue kindly examined Mexican and central American specimens of *Berberis* at the Harvard University herbaria. He found at least some leaflets with more or less similar venation in *B. longipes* (Standl.) Marroquín. *B. moranensis* (Hebenstr. & Ludw.) I.M. Jtn., *B. nigricans* O. Kuntze, *B. schiedeana* Schlecht., and *B. tinctoria* (Teran & Berl.) Nemo. From his brief comparisons, however, he concluded that on the whole none of these species seemed closer than *B. gracilis* to *B. claireae*. I therefore tentatively nominate *B. gracilis* as next of kin.

If *B. claireae* is indeed closest to species of mainland Mexico, its occurrence on the northwest coast of Baja California seems remarkable. It differs from *B. gracilis* notably in having more coriaceous leaves, a reduced number of leaflets (sometimes only one), and a smaller fruit with only two seeds.

Being far from large herbaria, I am grateful to those who rummaged through *Berberis* folders seeking answers to my questions: Annetta Carter at the University of California at Berkeley, Dr. Michael Donoghue at Harvard University, and Dr. Jerzy Rzedowski at the Instituto Politécnico in Mexico City.

REFERENCES CITED

- Ahrendt, Leslie W.A. 1961. *Berberis* and *Mahonia*: a taxonomic revision. J. Linn. Soc., Bot. 57:1 - 410.
- Benson, Lyman, and Robert A. Darrow. 1981. The trees and shrubs of the Southwestern deserts. Ed. 3. Univ. Arizona Press, Tucson.
- Chaney, Ralph W., and Herbert L. Mason. 1934. A Pleistocene flora from Santa Cruz Island, California. Publ. Carnegie Inst. Wash. 415:1 - 24.
- Ernst, Wallace R. 1964. The genera of Berberidaceae, Lardizabalaceae, and Menispermaceae in the southeastern United States. J. Arnold Arbor. 45:1 - 35.
- Marroquín de la Fuente, Jorge. 1972. A monographic study of the genus *Berberis* L. in Mexico. Ph.D. thesis, Northeastern University, Boston, Mass.
- Munz, Philip A. 1959. A California flora. Univ. California Press, Berkeley.
- _____. 1974. A flora of southern California. Univ. California Press, Berkeley.
- Wiggins, Ira L. 1980. Flora of Baja California. Stanford Univ. Press.

PLANTAE MESOAMERICANAE NOVAE. VII*

by Luis D. Gómez P. & Jorge Gómez-L.
Museo Nacional, San José, Costa Rica

Xanthosoma croatana sp. nov., rhizoma breve tuberosum, lactescens, latex albidus siccando aurantiacus. Foliorum petioli cassiusculi pallide virides, pilis densissime obtekti, vagina membranosa instructi, 30-50 cm longi, basi 3 cm crassi apicem versus attenuati; lamina adulta 30-40 cm longa, 22-30 cm e parte media lata, opaca, pallide virides, utrimque velutina, pilis 1-2-cellulatis hyalinis, cordato-ovata, lobo antico acuto vel obtusisculo, lobis posticis obtusiusculis subtruncatis vel pauciter rotundatis; nervis lateralibus primariis lobi antici utrinque 5, pilosis, nervis collectivis 2 marginibus distantibus (interno 2-3 mm, externo 5-6 mm). Pedunculus 1 cm crassus 30-35(40) cm longus, pilosus. Spathae tubus globosus, ± 5 cm, utrimque virens, apicem constrictus, constrictione (fauce) purpurea, intus pauce glanduloso-pilosus, glandulae sessiles, in maturitate fortissime clausus, nitentes; lamina spathae in maturitate caduca, elliptico-lanceolata, utrinque alba, pilosa, nervis violascentibus ex faucem effussis deinde incoloribus, 12-14 cm longa, 4.5-6 cm lata. Spadicis stipes 3-4 mm longus, inflorescentia feminea 3.5-6 cm longa, cylindrico-inflata, vix 100-florata, albida; inflorescentia mascula 6-7 cm longa, e medio 1 cm crassa, viride-violacea, in maturitate putrescente et caduca. Grana sulphurea, laeves, 2-3-4-adas coalescentes, vix 70 μ m. Ovaria ovoidea annulo styli eburneo, in sicco brunneo atque stigmatibus rotundo instructa. Semina subconica, longitudinaliter sulcata, 0.6 mm longa, alba. Infructescentia globosa, albo-virens, laminae spathae scariosae coronata.

Obviously a member of the *X. pilosum-mexicanum* group. It differs from both those species in the densely velutinous surfaces of the leaf, the length of the peduncles and the coloration of the spathe. The new species is named in honor of Dr. Thomas Croat of Missouri Botanical Gardens for his many contributions to the knowledge of Araceae.

HOLOTYPE: Rio Cabuyo, apx. 40 km NW of Canas, Guanacaste. Gordon Frankie & L. D. Gomez 18489 (CR). Isotypi: MO, F, K. PARATYPE: Pozo Azul de Abangares, Guanacaste, C. E. Valerio s.n. 29-8-81, USJ 23464 & 23465.

* Partially financed by grants from CONICIT and The Tinker Foundation to the senior author.

Cyperus costaricensis Gomez-L., sp. nov., culmus 60-160 cm altus; lamina foliorum 1-2 cm lata, longitudinaliter profunde sulcata; bracteae ca. 12, folia similes; inflorescentia supradecomposita; glumae cellulare-reticulatae, carina prasina, marginibus rubiginosis, facile distinguitur. Sectio Diffusi Kunth.

Planta perennes, rhizomate breve, recto, crasso; radicibus fibrosis, fuscis; culmus erectus, rigidus, trigonus, 60-160 cm altus, subantha ca. 7 mm crassus, plerumque laevigatus, minute marginibus scabrus, plurifolius; folia culmum superantia, lamina linearia, 1-2 cm latae, herbaceae, tricostatae e medio longitudinaliter profunde sulcatae, marginibus minute scabra, etiam nervo medio dorsalis, apicem acuminatae; vaginae purpureo-suffusae; bracteae ca. 12 folia similes, inaequalis, aliquod inflorescentiam superantes; bracteolae evaginantes, lineare-lanceolatae, margine scabrae; inflorescentia supradecomposita, diffusa, ampla multiradiata, 11-27 cm longa, 9-35 cm lata; radii patentes, valde inaequalis, rigidis, subtrigonis, laevis, usque 1.5 mm latis; prophyllis exsurgentis, multinervosis, purpureo suffusis, orae oblique secta postice scabra longe producta; radioli secundarii et tertiarii divergentes; spiculae numerosae, 3-6-digitatae, radiant, oblongae, 4-6 mm longae, 1.5 mm latae, turgidae, 10-12-florae; rachilla recta, exalata; glumae ovatae, 1.1-1.3 mm longae, cellulare-reticulatae, carina prasina, mucro breve, recto vel excurvo coronata, gluma lateraliter sanguinea; stamina 3; stylus profunde trifidus; achaenium 1.2 mm longum, 0.6 mm latum, ovatum, triquetrum, breviter apiculatum, castaneum, nitens.

A member of section Diffusi Kunth it is distinguished from its congeners by the width of leaves and bracts, the glumes with their green carinae and reddish sides and the number of stamens. HOLOTYPE: Faldas de la Fila Volcan Muerto, San Ramon, Alajuela 1000-1100 m, Gomez Laurito 8322 (CR). ISOTYPE: F. PARATYPI : 6658 & 6659 J. Gomez-L., CR, J.G-L. 8320 MO. Additional material: same locality, Gomez-L., 8248, CR.

Pterichis leo sp. nov., habitu *P. galeata* Lindl. et *P. weberbauriana* Kränzl. similis, sine dubio his speciebus proxima, differt latello rhomboideo, longitudine latitudine subaequantia, petaliis non unguiculatis.

Herba paludosa, parva, totta piloso-glandulosa viscidula; caulis brevissimus radices carnosissimas emittens, simplices. Folia una (raro 2-3) cito decidua, 7-8 cm longa, 15-17 mm lata, apicem acuta, viride, nervo medio purpureo. Inflorescentia adscendentes usque ad 30 cm longa, 10-15-florae, piloso-glandulosa; pedunculus ± 20 cm longus, bracteae distantes, arcte vaginantes, acutae 35-40 mm longae, 12-14 mm latae. Flores adscendentes, non resupinatas, pedicellus cum ovario 15 mm longus. Sepalum intermedium lanceolatum, acutum, purpurascens, 9-9.5 mm longum, 3.8-4 mm latum, extus piloso-glanduloso, intus gla-

brus, marginibus pellucidis; sepala lateralía lanceolata, acuta, 6-7 mm longa, 4 mm lata, recurvata. Petala libera e basi oblique curvatim lanceolata, apicem obtuso-rotundata, 8-9 mm longa, 3-3.2 mm lata, virides sed purpureo suffusa; tepala omnia trinervia, nerviis xerampelineis. Labellum arcte incurvatum et longitudinaliter plicatum, apicem breviter lobulatum, 7 mm longum, e parte media vix 10 mm latum, basim recto vel pauciter excavatum, apicem obtusum, carnosum, glandulis papillatis marginibus obtectus, glandulae flavae. Columna teres, truncata, brevissima, 2 mm longa; pollinia fusiformia, 1.5 mm longa, stipitibus viscidio communi punctiformi atropurpureum conniventibus; rostellum leviter productum, obtusum. Capsulae anguste ellipsoideae, 12-15 mm longae, vix 4 mm diametro, 6-costatae.

HOLOTYPE: In sphagnetum, 3 de Junio, Prov. de San Jose, 2800-3000 m, J. Gomez-L. 1243, CR. PARATYPE: In bog, Cerro de la Muerte, Cartago, 3100 m, L. Glicenstein in L.D.Gomez 18574, CR. The new species is named in honor of Leon Glicenstein, ardent student of our native orchids, for his many years of devoted and careful fieldwork.

The Costa Rican representatives of this mainly South American genus can be separated as follows:

- 1- Labellum chartreuse or very pale sulphur yellow, rounded cordate at base, apiculate-subulate at apex, with 2-3 veins on each side, these 1-3-branched. Lateral petals usually adhering to the dorsal sepal..... *P. costaricensis* O. Ames & Schweinf.
- 1¹ Labellum xerampelinum or greenish-marron, with marginal yellow papillae, straight or excavate at base, obtuse and flat at apex, with 4-6 veins/ side, these 1-forked. Tepals all free... *P. leo*

NEW RECORDS

Cyperus digitatus Roxburg, J.Gomez-L 6854; 6855; 6856, Cabezas, P. of Puntarenas; J. Gomez-L. 7085; 7086, La Cruz, Guanacaste.

Cladium jamaicense Crantz, Holst & Soto s.n. in Gomez-L. 8328, 8329, Cahuita, Prov. Limon.

Variscus pedunculatus (R. Br.) T. Koyama [*Remirea maritima* Aublet] C. E. Valerio 52, Tortuguero, Prov. Limon.

Hypolytrum longifolium (L.C.Rich.) Nees ssp. *nicaraguensis* (Liebm.) T. Koyama, Gomez-L. 790], 7902, Tortuguero, Prov. Limon.

Polycarpon tetraphyllum (L.) L., Tierra Blanca de Cartago, Gomez -L. 8629, 8630 [fide Wm. Burger, in litt.].

Agalinis hispidula (Martius) D'Arcy, Gomez-L. 7034, 7035, La Cruz, Provincia Guanacaste.

JALTOMATA WERFFII: A CORRECTION

W. G. D'Arcy

MISSOURI BOTANICAL GARDEN

The recent publication of *Jaltomata werffii* D'Arcy (PHYTOLOGIA 52:9. 1982) contained a typographic error (werfii instead of werffii) which is hereby corrected. The species was named for Henk van der Werff, and the epithet preserves the spelling of his name.

- - - - -

NOTES ON NEW AND NOTEWORTHY PLANTS. CLXII

Harold N. Moldenke

AEGIPHILA GLABRATA f. *MACROPHYLLA* Mold., f. nov.

Haec forma a forma typica speciei laminis foliorum maioribus usque ad 28 cm. longis 10 cm. latis recedit.

This form differs from the typical form of the species in its much larger leaf-blades on flowering shoots, which are to 28 cm. long and 10 cm. wide.

The form is based on *Prance, Hill, Pennington, & Ramos 24086*, collected in a forest on terra firme 2 hours above Rio Jacarizinho on the Rio Javari, Loreto, Peru, on October 24, 1976, and is deposited in the Britton herbarium at the New York Botanical Garden. The collectors note: "Treelet 2 m., corolla greenish-yellow".

CORNUTIA PYRAMIDATA f. *SERRATA* Mold., f. nov.

Haec forma a forma typica speciei laminis late ellipticis marginaliter serratis recedit.

This form differs from the typical form of the species in its leaf-blades being broadly elliptic and marginally distinctly serrate.

The type of the form was collected by Adrien Questel (no. 2388) at Vieux Port, at 50 m. altitude, Guadeloupe, on April 10, 1938, and is deposited in the United States National Herbarium at Washington.

LANTANA GLANDULOSISSIMA var. *GRANDIS* Mold., var. nov.

Haec varietas a forma typica speciei foliis maioribus pedunculis valde elongatis capitulis maioribus recedit.

This variety differs from the typical form of the species in being larger in all its parts, the leaf-blades to 13 cm. long and 8 cm. wide, the peduncles to 13.5 cm. long, and the flowering-heads to 3 cm. wide during anthesis, the bracts conspicuous, spreading, ovate-lanceolate, to 15 mm. long and 5 mm. wide.

The type of the variety was collected by William R. Maxon and A. T. Valentine (no. 6988) between the Chagres Batteries and Fort Lorenzo on the Fort Sherman Military Reservation, Canal Zone, Panama, on June 14, 1923, and is deposited in the United States National Museum at Washington. The collectors note: "Stems ascending, virgate, all very prickly, the leaves viscid on both sides."

LANTANA HORRIDA f. *BRACTEOSA* Mold., f. nov.

Haec forma a forma typica speciei bracteis maioribus divergentibus vel reflexis usque ad 10 mm. longis 4 mm. latis recedit.

This form differs from the typical form of the species in its much larger flower-heads, which are to 3 cm. wide during anthesis, and the larger and more conspicuous bracts, which are up to 10 mm. long and 4 mm. wide, oblong-lanceolate, widely divergent or reflexed during anthesis.

The type of this form was collected by Brother Nicolas but distributed as *Arsène* 5426, at Cholula, in the vicinity of Puebla, Puebla, Mexico, on September 15, 1910, and is deposited in the United States National Herbarium at Washington.

STACHYTARPHETA CAYENNENSIS f. *PURPUREA* Mold., f. nov.

Haec forma a forma typica speciei corollis atropurpureis recedit.

This form differs from the typical form of the species in having deep-purple corollas with a white center.

The type of the form was collected by S. Knapp and J. Mallet (no. 2937) in secondgrowth scrub and forest and disturbed tropical dry forest, at 0--20 m. altitude, at Punta de Cocos, on the southern tip of Isla del Ray, Pearl Islands, Panama, on January 19, 1982, and is deposited in the Lundell Herbarium at the University of Texas, Austin. The collectors describe the plant as a shrub, 1 m. tall.

SYNGONANTHUS BRACTEOSUS var. *SCRUPULOSUS* Mold., var. nov.

Haec varietas a forma typica speciei pedunculis vaginisque dense piloso-pubescentibus foliis utrinque leviter pilosis recedit.

This variety differs from the typical form of the species in having its peduncles and sheaths very densely ashy-grayish pilose with wide-spreading hairs and the leaves more lightly pilose on both surfaces.

The type of the variety was collected by Cleofé E. Calderón, C. P. Monteiro, and J. Guedes (no. 2692) in open campina region 53 km. west of the Aripuanã River, on the Transamazon Highway,

Amazonas, Brazil, collected on June 27, 1979, and deposited in the Lundell Herbarium at the University of Texas, Austin.

SYNGONANTHUS ELEGANTULUS var. *GLABRIFOLIUS* Mold., var. nov.

Haec varietas a forma typica speciei foliis glabris vel subglabris recedit.

This variety differs from the typical form of the species in having its leaves completely glabrous or subglabrous.

The variety is based on *Calderon, Monteiro, & Guedes 2564* from along the Transamazon Highway 9 km. west of the Rio dos Pombos, about 1.5 km. east of Igarape dos Pombos, and about 64 km. east of the Aripuanã, Amazonas, Brazil, collected on June 18, 1979, and deposited in the Lundell Herbarium at the University of Texas, Austin. The collectors note that the plant was common in wet spots of white sand campina, the inflorescences white.

VERBENA URTICIFOLIA f. *INCARNATA* (Raf.) Mold., stat. nov.

Verbena incarnata Raf., Atl. Journ. 154. 1832.

- - - - -

ADDITIONAL NOTES ON THE GENUS *AMASONIA*. IX

Harold N. Moldenke

AMASONIA L. f.

Additional synonymy: *Taligalia* Robledo, in herb.

Additional & emended bibliography: Aubl., Hist. Pl. Guian. Franc. 2 [Suppl.]: 29. 1775; Willd. in L., Sp. Pl., ed. 4, 3 (2): 6 & 394. 1802; Poir. in Lam., Tabl. Encycl. Meth. Bot. 3: pl. 543 (1819) and 4: 56. 1823; Loud., Hort. Brit., ed. 1, 245 & 529 (1830) and ed. 2, 245 & 529. 1832; G. Don in Loud., Hort. Brit., ed. 3, 245 & 529. 1839; G. Don in Sweet, Hort. Brit., ed. 3, 552. 1839; Reichenb., Deutsch. Bot. [Repert. Herb. Nom.] 108. 1841; C. Muell. in Walp., Ann. Bot. Syst. 5: 712. 1860; Durand, Ind. Gen. Phan. 320. 1888; Baill., Hist. Pl. 11: 80, 97, & 112. 1891; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 133, 138, 139, 142, 144, & 156--157, fig. 60 E & F. 1895; Dalla Torre & Sarms, Gen. Siphonog., imp. 1, 431. 1904; Post & Kuntze, Lexicon 22 & 688. 1904; Lemée, Dict. Descrip. Syn. Gen. Pl. Phan. 8b: 652. 1943; Mold., Phytol. Mem. 2: 4, 103, 106, 114, 121, 124, 125, 132, 139, 176, 345, 373, 397, 405, & 444. 1980; Mold., Phytologia 47: 137--140 (1980), 47: 502 (1981), and 48: 290, 438, & 505. 1981; Rogerson, Becker, Buck, & Long, Bull. Torrey Bot. Club 108: 293. 1981; Mold., Phytologia 50: 247, 268, & 503. 1982.

It is of interest to note here that Reichenbach (1828) classified this genus in the *Lamiaceae*.

The *Plowman & al.* 9373, distributed as an *Amasonia*, actually is

something in the *Acanthaceae*; Hermann 11245 is also non-verbenaceous.

AMASONIA ANGUSTIFOLIA Mart. & Schau.

Additional bibliography: Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 157. 1895; Mold., Phytol. Mem. 2: 139 & 524. 1980; Mold., Phytologia 47: 138. 1980.

Additional citations: BRAZIL: Goiás: G. Gardner 3411 [Macbride photos 20345] (Ld--photo of type).

AMASONIA ARBOREA H.B.K.

Additional & emended bibliography: Walp., Repert. Bot. Syst. 4: 124--125. 1845; Mold., Phytol. Mem. 2: 106, 114, 121, 124, 125, 139, 373, & 524. 1980; Mold., Phytologia 47: 138--139. 1980.

Recent collectors describe this plant as an herb with a woody base, 0.5--1.25 m. tall, the bracts and calyx red or dark-red, and the fruit green, "surrounded by the persistent and now patent calyx", and have found it growing in forests, at 350--620 m. altitude, in flower in November, and in fruit in February and November. The corollas are said to have been "pale greenish-yellow" on Maas & al. 4455.

The Lescure 650, distributed as *A. arborea*, actually is *A. lasiocaulos* Mart. & Schau., while Persaud 189 is *A. lasiocaulos* var. *macrophylla* Mold.

Additional citations: GUYANA: Maas, Westra, & al. 4455 (N). FRENCH GUIANA: Granville 4356 (Ld); Herb. Serv. Forest. Cayen. 4477 (P); Sastre 1563 (Cy). BRAZIL: Pará: Plowman, Davidse, Rosa, Rosario, & Santos 8444 (Ld, N).

AMASONIA CALYCINA Hook. f.

Additional bibliography: Mold., Phytologia 40: 403. 1978; Mold., Phytol. Mem. 2: 121, 145, 444, & 524. 1980.

AMASONIA CAMPESTRIS (Aubl.) Mold.

Additional synonymy: *Amasonia campestris* (Aubl.) Mold. ex Holm, Pancho, Herberger, & Plucknett, Geogr. Atlas World Weeds 21, sphalm. 1979.

Additional & emended bibliography: Willd. in L., Sp. Pl., ed. 4, 3 (2): 394. 1802; Poir. in Lam., Tabl. Encycl. Méth. Bot. 3: pl. 543. 1819; Loud., Hort. Brit., ed. 1, 245 & 529 (1830) and ed. 2, 245 & 529. 1832; G. Don in Loud., Hort. Brit., ed. 3, 245. 1839; G. Don in Sweet, Hort. Brit., ed. 3, 552. 1839; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 157, fig. 60 E & F. 1895; Mold., Phytol. Mem. 2: 103, 114, 121, 124, 125, 139, 345, 373, 444, & 524. 1980; Mold., Phytologia 47: 139. 1980.

Emended illustrations: Poir. in Lam., Tabl. Encycl. Méth. Bot. 3: pl. 543. 1819; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 157, fig. 60 E & F. 1895.

Recent collectors describe this plant as an unbranched subshrub, single-stemmed, 0.3--1 m. tall, the leaf-blades membranous, green or dark-green above, dull-green or "lie-de-vin" beneath with the secondaries violet beneath, the bracts adaxially red, green to yel-

low abaxially, or bright-red and turning dark-red in age, or scarlet to deep-red above and paler beneath, the calyx light-green to red or red-purple, the fruit light-green when young, black and shiny when ripe, and have found it growing on savannas, exposed rocky slopes, open white sand campina, in partial shade at campina margins, and *Byrsonima* savannas slowly being invaded by weedy plants, at 280--405 m. altitude, flowering in January, August, and December, and both in flower and fruit in March and August.

The corollas are said to have been "yellow" on Davidse 2595, Lescure 40, Liesner & González 5934, and Rabledo 244, "light-yellow" on Plowman & al. 9699, and "pale-green" on Plowman & al. 9704. In Venezuela the plant is said to be known as "cola de gallo" and "farfara roja". In French Guiana it is said to be used in the treatment of "palikur sterile".

Material of *Amasonia campestris* has been misidentified and distributed in some herbaria as *Acanthaceae* sp. On the other hand, the Murça Pires & Santos 16139 and Silva & Pinheiro 4077, distributed as *A. campestris*, actually are *A. hirta* Benth., while Archer 7606 and Silva 260 are *A. lasiocaulos* Mart. & Schau.

Additional citations: VENEZUELA: Bolívar: Liesner & González 5934 (Ld); Steyermark 86561 (N). Guárico: Ramirez 1 (Ld); Tamayo 4115 (N). Monagas: Dumont, Morillo, Samuels, & Cain VE.7717 (N). TRINIDAD & TOBAGO: Trinidad: Davidse 2595 (Ld). FRENCH GUIANA: Granville 4315 (Cy); Herb. Serv. Forest. Cayen. 3482 (P), 3582 (P), 3701 (P), 3751 (P), 8485 (P); Lescure 40 (Cy, Cy); Prevost & Grenand 1972 (Ld). BRAZIL: Amapa: Robledo 244 (N). Bahia: Anderson, Stieber, & Kirkbride 36760 (N). Pará: Plowman, Rosa, & Rosario 9699 (Ld, Me), 9704 (Ld).

AMASONIA CAMPESTRIS var. *SURINAMENSIS* Mold.

Additional bibliography: Mold., Phytologia 40: 404. 1978; Mold., Phytol. Mem. 2: 124 & 524. 1980.

Granville describes this plant as an herb, woody at the base, and more or less branched from the base due to the effect of savanna fires, the leaves yellow-green, the bracts and calyx violet. A long description in French, with floral diagrams and in situ photographs, accompany his no. 367 collection.

Additional citations: FRENCH GUIANA: Granville 367 (Cy), 3922 (Cy, Cy).

AMASONIA HIRTA Benth.

Additional bibliography: Mold., Phytol. Mem. 2: 139, 176, 405, & 524. 1980; Mold., Phytologia 47: 139--140 (1980), 48: 290 (1981), and 50: 247 & 268. 1982.

Recent collectors have encountered this plant on campos and campo cerrado, in semi-deciduous forests and scrub, and in sandy soil in high exposed rocky meadows, at 420--1600 m. altitude, describing it as a coarse, unbranched herb, 40 cm. tall, the leaves "tinged with purple", the bracts orange or vermillion, the "sepals in bud orange, red when open", and the fruit green. They have found

it in anthesis in January, February, October, and December, and in fruit in February and December. The corollas are said to have been "yellow" on Austin & al. 7066 and Gates & Estabrook 28, "cream" on Mendonça 90, yellowish "com tom laranga, bractes mais escuras" on Murça Pires & Santos 16139, and "greenish-white" on Daly & al. 1792.

Gates & Estabrook report the plant "rare in sandy soil of rocky campo". Plowman & his associates found it in open cerrado with scattered trees on sandy soil, *Mesosetum* sp. the dominant grass, describing it as an erect herb, with a slender xylopodium, bright-red bracts (dark-red in fruit), and the ripe fruit black.

Additional citations: BRAZIL: Amapá: Austin, Nauman, Secco, Rosário, & Santos 7066 (Ld, N). Distrito Federal: Mendonça & Chagas Silva 66 (W--2927035). Goiás: Gates & Estabrook 28 (Mi, N); R. A. Mendonça 90 (N, W--2927034); Murça Pires & Santos 16139 (N); Plowman, Davidse, Rosa, Rosario, & Santos 9166 (Ld, N). Pará: Archer 8337 (W--2592945); Daly, Callejas, Silva, Taylor, Rosário, & Santos 1792 (Ld). Rondônia: Silva & Pinheiro 4077 (N).

AMASONIA HIRTA var. *PARAËNSIS* Mold., Phytologia 48: 290. 1981.

Bibliography: Mold., Phytologia 48: 290 (1981) and 50: 247 & 268. 1982.

The type specimen of this variety exhibits somewhat fasciated stems.

Citations: BRAZIL: Pará: Plowman, Davidse, Rosa, Rosário, & Santos 9525 (Ld--type, N--isotype).

AMASONIA LASIOCAULOS Mart. & Schau.

Additional synonymy: *Amazonia lasiocaulos* Mart. & Schau. ex Mold., Prelim. List Inv. Names 5, in syn. 1940.

Additional bibliography: C. Muell. in Walp., Ann. Bot. Syst. 5: 1860; Mold., Phytol. Mem. 2: 106, 114, 121, 132, 139, 373, & 524. 1980; Mold., Phytologia 47: 138 (1980), 48: 438 (1981), and 50: 247 & 268. 1982.

Recent collectors describe this plant as an erect herb or unbranched subshrub or shrub, 1--2 m. tall, with woody roots, the stems brown, the leaves dark-green above, dull or purplish beneath, the inflorescence terminal, and the bracts red or bright-red to dark-red in the upper parts of the inflorescence, green in the lower parts, the calyx yellowish-green, later turning red or bright-red to dark-red (especially in fruit), the filaments yellow, the anthers brown, and the [immature?] fruit glossy-green. They have encountered it in low forests on white sand (campina rana), "in open areas of low campina forests on white sand", "on savannas dominated by *Axonopus* sp., *Bulbostylis paradoxa*, and *Curatella americana*, the trees and shrubs widely spaced as single individuals, surrounded by forest", and "in heavy leaf litter over brown sand", at 2--50 m. altitude, in anthesis in March and April, and in fruit in November.

The corollas are said to have been "greenish-cream" on Archer 7606, "soda-yellow" on Lescure 650, and "yellow" on Davidse & al.

17632 & 17859. Archer reports that the plant is used by natives in the treatment of stomach inflammations.

The Alencar 440, Campbell & al. P.22458, Egler & Irwin 46426, Hoehne Com. Rondon 1335, Murça Pires & al. 50308, Persaud 189, Plowman & al. 9562, Prance & al. 11782, Silva 2864, and Silva & Souza 2278, distributed and previously cited by me as typical *A. lasiocaulos*, are now considered by me to represent its var. *macrophylla* Mold.

Additional citations: FRENCH GUIANA: Lescure 650 (Cy, Cy, Ld). BRAZIL: Pará: Archer 7606 (N, W--2592958); Cid, Ramos, Mota, & Rosas 2188 [Herb. Inst. Nac. Pesq. Amaz. 96427] (N); Davidse, Rosa, Rosario, & Silva 17632 (N), 17859 (N); Plowman, Rosa, & Rosario 9699 (Lc, N); Silva 260 (Be, W--2592960).

AMASONIA LASIOCAULOS var. MACROPHYLLA Mold., Phytologia 48: 438. 1981.

Bibliography: Mold., Phytologia 48: 438 (1981) (and 50: 247 & 268. 1982).

Most of the collections cited below were previously regarded by me as representing typical *A. lasiocaulos* Mart. & Schau. or as *A. spruceana* Mold. and were so distributed and cited.

Collectors have described this plant as an herb, unbranched shrub, or subshrub, 1--2 m. tall, the stems brown, the leaves clustered at the top, dark-green above, dull or "avermelhada ma parte da baixo e verde na do cima", the bracts red, bright-red, or vermillion to scarlet [some collectors say "inflorescence" scarlet or vermillion], the calyx red or bright-red and remaining red even in the fruiting stage, and the [immature?] fruit green or glossy-green. The leaves are most often described as purple or purplish on the under surface.

Collectors have encountered this plant in heavy leaf litter on brown sand, in low forests on white sand (campina rana), and in forests on terra firme, at 110 m. altitude, in flower in January, March, April, June, July, August, and September. Egler & Irwin refer to it as "occasional in forest shade" and Murça Pires and his associates also found it "occasional in dense forests". The corollas are said to have been "yellowish-white" on Egler & Irwin 46426, "light-yellow" on Murça Pires & al. 50308, "light-green" on Prance & al. 11782, "red" on Silva & Souza 2278, "pale-yellow" on Plowman & al. 9562, "yellow" on Hoehne Com. Rondon 1335, and "vermillion" on Alencar 440. The vernacular name, "mendoca", has been recorded.

It is quite possible that this taxon may actually prove to be a form of the closely related *A. arborea* H.B.K.

Citations: GUYANA: Persaud 189 (N). BRAZIL: Acre: Prance, Maas, Kubitzki, Steward, Ramos, Pinheiro, & Lima 11782 (Ld, N). Amapa: Egler & Irwin 46426 (N); Murça Pires, Rodrigues, & Irvine 50308 (N). Amazonas: Alencar 440 (N); Prance, Maas, Woolcott, Monteiro, & Ramos 15818 (Ld--isotype, N--type). Mato Grosso: F. C. Hoehne Com. Rondon 1335 (N). Pará: Campbell, Ongley, Ramos, Monteiro, & Nelson P.22458 (N); Cid, Ramos, & Mota 1177 [Herb. Inst. Nac. Pesq. Amaz. 94394] (N); Plowman, Rosa, & Rosário 9562

(Ld, N); *Silva* 2864 (N); *Silva & Souza* 2278 (N).

AMASONIA OBOVATA Gleason

Additional bibliography: Mold., *Phytol. Mem.* 2: 114, 373, & 524. 1980; Mold., *Phytologia* 47: 140. 1980.

AMASONIA SPRUCEANA Mold.

Additional bibliography: Mold., *Phytol. Mem.* 2: 106, 114, 139, 345, 373, & 524. 1980; Mold., *Phytologia* 47: 140. 1980.

The *Prance & al.* 15818 previously cited and distributed as *A. spruceana* is now regarded as the type collection of *A. lasiocaulos* var. *macrophylla* Mold.

 ADDITIONAL NOTES ON THE GENUS AEGIPHILA. XXX

Harold N. Moldenke

AEGIPHILA Jacq.

Additional synonymy: *Callicarpa* R. & P. ex Cham., *Jinnaea* 7: 109, in syn. 1832. *Algiphila* Stahl, *Estud. Pl. Puerto Rico*, ed. 1, 3: 336, sphalm. 1888. *Aegophila* Jacq. ex Post & Kuntze, *Lexicon* 688. 1904. *Aegophylla* Steud. ex Mold., *Phytologia* 52: 127, in syn. 1982. *Aegiphylle* Silva & Bahia ex Mold., *Phytologia* 50: 256, in syn. 1982. *Algiphila* Mart. ex Mold., *Phytologia* 50: 256, in syn. 1982.

Additional & emended bibliography: J. F. Gmel. in L., *Syst. Nat.*, ed. 13, imp. 2, 2: 42, 246, & 259. 1791; Lam., *Tabl. Encycl. Méth. Bot.* 1: pl. 70, fig. 1 & 3, & 71 (1791) and 1: 293. 1792; Reichenb., *Conspect. Reg. Veg.* 1: 117. 1828; Loud., *Hort. Brit.*, ed. 1, 529. 1830; Sweet, *Hort. Brit.*, ed. 2, 416. 1830; Loud., *Hort. Brit.*, ed. 2, 529. 1832; G. Don in Loud., *Hort. Brit.*, ed. 3, 529. 1839; G. Don in Sweet, *Hort. Brit.*, ed. 3, 550. 1839; Reichenb., *Deutsch. Bot.* [Report. Herb. Nom.] 108. 1841; Brongn., *Enum. Gen. Pl.*, ed. 1, 64 & 65. 1843; Walp., *Repert. Bot. Syst.* 4: 71, 118--124, 126, & 130--131. 1845; Lindl., *Veget. Kingd.*, ed. 1, 664 (1846) and ed. 2, 664. 1847; Walp., *Repert. Bot. Syst.* 6: 690 & 692. 1847; Walp., *Ann. Bot. Syst.* 1: 544. 1849; Brongn., *Enum. Gen. Pl.*, ed. 2, 120. 1850; Lindl., *Veget. Kingd.*, ed. 3, 664. 1853; C. Muell. in Walp., *Ann. Bot. Syst.* 5: 710. 1860; Bocq. in Baill., *Rec. Obs. Bot.* 3: 178, 180, 182, 183, 187--190, 192, & 264. 1863; Durand, *Ind. Gen. Phan.* 321. 1888; Stahl, *Estud. Pl. Puerto Rico*, ed. 1, 3: 300 & 336. 1888; Baill., *Hist. Pl.* 11: 87, 88, 91, & 119, fig. 101 & 102. 1892; Briq. in Engl. & Prantl, *Nat. Pflanzenfam.*, ed. 1, 4 (3a): 133, 134, 136, 137, 139, 142, 143, & 164--166, fig. 62 C--E. 1895;

Willsp., Field Mus. Publ. Bot. 1: 523. 1902; Post & Kuntze, Lexicon 11 & 688. 1904; D. H. Scott. in Solared., Syst. Anat. Dicot. [transl. Boodle & Fritsch] 1: 630, 631, & 634 (1908) and 2: 1021. 1908; Urb., Symb. Antill. 4: 536. 1911; J. Hutchins., Fam. Flow. Pl., ed. 1, 1: 309 & 313. 1926; Corrêa, Dicc. Pl. Uteis Bras. 2: 50, 369, & 485. 1931; Stahl, Estud. Fl. Puerto Rico, ed. 2, 3: 300 & 336. 1937; Lamée, Dict. Descrip. Syn. Gen. Pl. Phan. 8b: 650, 655, & 656. 1943; J. Hutchins., Fam. Flow. Pl., ed. 2, 1: 395. 1959; Egler, Bol. Mus. Para. Goeldi, ser. 2, Bot. 18: 29. 1963; Liogier, Rhodora 67: 350. 1965; J. Hutchins., Fam. Flow. Pl., ed. 3, 487 & 910. 1973; León & Alain, Fl. Cuba, imp. 2, 2: 309. 1974; Klein, Sellowia 31: 163. 1979; Virkki, Journ. Agric. Univ. Puerto Rico 63: 50 & 65. 1979; Bawa, Ann. Rev. Ecol. Syst. 11: 16. 1980; J. T. & R. Kartesz, Syn. Checklist Vasc. Fl. 2: 465. 1980; Mold., Phytol. Mem. 2: 4, 21, 59, 70, 73, 75, 77, 78, 80, 82, 87, 92, 94, 97--101, 103--106, 112--114, 121, 124--127, 131, 135--138, 172, 173, 176, 180, 184, 341, 344, 369--373, 376, 377, 383, 390, 397, 399, 412, 422, 423, 429, 442, 519--522, & 627. 1980; Seymour, Phytol. Mem. 1: 242. 1980; Virkki, Journ. Agric. Univ. Puerto Rico 64: 75, 76, 81, 84, 89, 264, 265, 267, 269, & 271--273, fig. 4 (top). 1980; Mold., Phytologia 47: 43--51 & 135--137 (1980), 47: 502 (1981), 48: 271, 438, & 505 (1981), 49: 475 & 505 (1981), and 50: 12. 1981; Regerson, Becker, Buck, & Long, Bull. Torrey Bot. Club 108: 140 & 293. 1981; Mold., Phytologia 50: 240, 242, 244--248, 256, 268, & 503 (1982), 51: 279 & 484 (1982), and 52: 115, 116, 118--120, & 197. 1982.

It is of interest to note that Reichenbach (1828) classifies this genus in the Lamiaceae.

Additional excluded taxa: Aegiphila violacea Anon. ex Mold., Phytologia 50: 256, in syn. 1982 = Schlegelia violacea (Aubl.) Griseb., Bignoniaceae.

The Ilitis, Ilitis, Ugent, & Ugent 367 and Soukup 2555, distributed as Aegiphila sp., actually are Cestrum sp. in the Solanaceae, while Aubreville 300 is Schlegelia sp. in the Bignoniaceae and Jönsson 363a is also not verbenaceous.

AEGIPHILA ALBA Mold.

Additional bibliography: Mold., Phytologia 47: 43-44. 1980; Mold., Phytol. Mem. 2: 105, 126, & 519. 1980.

Escobar refers to this plant as a tree, 8 m. tall, with tetragonal branches, but also states on the label accompanying his collection "1250 pies de statura" [obviously an error for "altura"]. Dodson & Gentry refer to it as a tree, 10 m. tall, with white corollas, and discovered it in anthesis in February.

Additional citations: ECUADOR: Cotopaxi: Dodson & Gentry 12283 (Ld). El Oro: Escobar 1203 (Ld).

AEGIPHILA AMAZONICA Mold.

Additional bibliography: Mold., Phytologia 47: 44. 1980; Mold., Phytol. Mem. 2: 121, 131, 136, & 519. 1980.

Recent collectors describe this plant as a shrub, 2--2.5 m. tall, or a treelet, 2 m. tall, with yellow-green calyx, white corolla, and yellow-orange fruit, and have found it growing in pas-

tures and open roadside thickets, at 70--80 m. altitude, in anthesis in March and in fruit in July. The species is obviously closely related to A. bracteolosa Mold. of the same region.

Additional citations: GUYANA: Maas, Westra, & al. 3984. PERU: Loreto: Gentry & Reville 16557 (N). BRAZIL: Amazônas: Nascimento 701 (N); Rodrigues & Coêlho 2607 [Herb. Inst. Nac. Pesq. Amaz. 9145] (N). Pará: Plowman, Davidse, Rosa, Rosário, & Santos 8525 (Ld, N); Plowman, Rosa, & Rosário 9770 (Ld, N).

AEGIPHILA ANOMALA Pittier

Additional bibliography: Mold., Phytologia 46: 319. 1980; Mold., Phytol. Mem. 2: 80, 82, 369, & 519. 1980.

Recent collectors describe this plant as a small, low-branched tree, 3--10 m. tall, or shrub, 5--6 m. tall, "possibly epiphytic or a climber" [Sytsma 4066], the [flower-] buds white, calyx green, stigma-lobes 2, long, filamentous, and [immature?] fruit green or white-spotted, round, hard, "acorn-like". They have encountered it in forests, cloud forests, and elfin forests and along roadsides, at 600--1300 m. altitude, in flower from May to July and in fruit in January, April, September, and November. D'Arcy & Dressler comment: "flowers sometimes zygomorphic". The corollas are said to have been "white" on Antonio 1251, D'Arcy & Dressler 5488, and Folsom 3237, "cream" on Hammel 3778, and "pale-yellow" on Antonio 2458.

Material of this species has been misidentified and distributed in some herbaria as Quararibea sp. and "Bombacaceae".

Additional citations: COSTA RICA: Cartago: Collector undetermined 1398 (W--2217163). PANAMA: Coclé: D'Arcy, Hammel, Hill, Schwartz, Wolcott, & Wolcott 13331 (Ld); Folsom 3237 (Ld); Knapp 1057 (Ld); Sytsma 4066 (Ld). Panamá: Antonio 1251 (Ld), 2458 (Ld); D'Arcy & Dressler 5488 (Ld), 5491 (E--2889956); Hammel 3778 (E--2904988), 5846 (Ld); Sytsma 1145 (Ld).

AEGIPHILA ARCTA Mold.

Additional bibliography: Mold., Phytologia 46: 319. 1980; Mold., Phytol. Mem. 2: 112 & 519. 1980.

AEGIPHILA AUSTRALIS Mold.

Additional bibliography: Mold., Phytologia 40: 209. 1978; Mold., Phytol. Mem. 2: 136 & 519. 1980.

AEGIPHILA BOGOTENSIS (Spreng.) Mold.

Additional bibliography: Mold., Phytol. Mem. 2: 105, 112, 126, 371--373, 399, & 519. 1980; Mold., Phytologia 46: 319--320 (1980), 48: 271 (1981), and 50: 244. 1982.

Recent collectors describe the fruit of this species as 1.5 cm. long and 1.2 cm. wide, red when mature. They have found the plant growing at 2800--3750 m. altitude, in flower in October and in fruit in May. The corollas are said to have been "white or whitish" on Bernardi 10836.

Material of this species has been misidentified and distributed

in some herbaria as Citharexylum sp.

Additional citations: COLOMBIA: Norte de Santander/Cesar: Garcia-Barriga & Jaramillo M.19906 (W--2910638). VENEZUELA: Mérida: Bernardi 10836 (N, W--2914668).

AEGIPHILA BOGOTENSIS var. **AEQUINOCTIALIS** Mold.

Additional bibliography: Mold., *Phytol. Mem.* 2: 105, 112, 126, 371, & 519. 1980; Mold., *Phytologia* 46: 319. 1980.

AEGIPHILA BOGOTENSIS f. **TERNATA** Mold.

Additional bibliography: Mold., *Phytologia* 46: 319--320. 1980; Mold., *Phytol. Mem.* 2: 105, 112, 370, & 519. 1980.

AEGIPHILA BOLIVIANA Mold.

Additional bibliography: Mold., *Phytologia* 40: 210. 1978; Mold., *Phytol. Mem.* 2: 173 & 519. 1980.

AEGIPHILA BRACHIATA Vell.

Additional bibliography: Walp., *Repert. Bot. Syst.* 4: 122 & 124. 1845; Briq. in Engl. & Prantl, *Nat. Pflanzenfam.*, ed. 1, 4 (3a): 166. 1895; Mold., *Phytologia* 47: 44 & 47. 1980; Mold., *Phytol. Mem.* 2: 136, 176, 184, & 519. 1980.

Recent collectors describe this plant as a shrub, 2.5 m. tall, the flowers inodorous, and have found it to be "common in half shade" [in Paraguay], in anthesis in January and September. The corollas are said to have been "yellow" on Vavrek & Cuevas 318.

Additional citations: BRAZIL: Rio Grande do Sul: Leite 3022 (N). PARAGUAY: Vavrek & Cuevas 318 (W--2952983). ARGENTINA: Corrientes: Krapovickas, Cristóbal, Carnevali, Quarin, González, & Isikawa 24311 (Ws).

AEGIPHILA BRACTEOLOSA Mold.

Additional bibliography: Mold., *Phytologia* 47: 44. 1980; Mold., *Phytol. Mem.* 2: 105, 121, 131, 136, 370, & 519. 1980.

This taxon is obviously very close to A. amazonica Mold.

AEGIPHILA BRASILIENSIS Mold.

Additional bibliography: Mold., *Phytologia* 40: 211. 1978; Mold., *Phytol. Mem.* 2: 137 & 519. 1980.

AEGIPHILA BREVIFLORA (Rusby) Mold.

Additional bibliography: Mold., *Phytologia* 40: 211. 1978; Mold., *Phytol. Mem.* 2: 173 & 519. 1980.

AEGIPHILA BUCHTIENII Mold.

Additional bibliography: Mold., *Phytol. Mem.* 2: 173 & 519. 1980; Mold., *Phytologia* 46: 320. 1980.

AEGIPHILA CANDELABRUM Briq.

Additional bibliography: Mold., *Phytologia* 47: 44. 1980; Mold., *Phytol. Mem.* 2: 137, 176, & 519. 1980.

AEGIPHILA CAPITATA Mold.

Additional bibliography: Mold., *Phytologia* 40: 212. 1978; Mold., *Phytol. Mem.* 2: 137 & 519. 1980.

AEGIPHILA CASSELIAEFORMIS Schau.

Additional bibliography: Mold., *Phytologia* 40: 212. 1978; Mold., *Phytol. Mem.* 2: 137 & 519. 1980.

AEGIPHILA CATATUMBENSIS Mold.

Additional bibliography: Mold., *Phytol. Mem.* 2: 113 & 519. 1980; Mold., *Phytologia* 46: 320. 1980.

AEGIPHILA CAUCENSIS Mold.

Additional bibliography: Mold., *Phytologia* 46: 320 & 337. 1980; Mold., *Phytol. Mem.* 2: 105, 131, 370, & 519. 1980.

Recent collectors refer to this plant as a shrub, 1.5 m. tall, and have found it growing at 350—900 m. altitude, in flower in December. The corollas are said to have been "white" on Diaz & al. 693. The Williams collection, cited below, was previously incorrectly regarded by me as A. peruviana Turcz.

Additional & amended citations: PERU: Loreto: Diaz, Oscores, & Jaramillo 693 (Ld). San Martín: Ll. Williams 6152 (F--626992, (Ld--photo, N, N--photo).

AEGIPHILA CAYMANENSIS Mold.

Additional bibliography: Mold., *Phytologia* 25: 295. 1973; Mold., *Phytol. Mem.* 2: 92 & 519. 1980.

AEGIPHILA CEPHALOPHORA Standl.

Additional bibliography: Mold., *Phytol. Mem.* 2: 80, 82, & 519. 1980; Mold., *Phytologia* 46: 320—321 (1980), 50: 244 (1982), and 52: 118. 1982.

Recent collectors describe this plant as a vine or liana, or as "a small tree", the flowers 4-merous, and the fruit hard, at first green, later "green-gold" or orange, "pendent in close clusters, with persistent style", and have found it growing along roadsides in and at the edges of secondary forests and in tropical wet to very wet forests in the transition zone where the rainfall is approximately 44 cm. per year, at 50—700 m. altitude, in fruit in February, August, and December. Stevens encountered it in "road-side thickets and remnant patches of tall evergreen forest."

Additional citations: COSTA RICA: Heredia: W. D. Stevens 13498 (Ld). PANAMA: Panamá: Folson, Collins, & Monte 6720 (Ld). COLOMBIA: Antioquia: Alverson, White, & Shepherd 324 (Ws); J. Denslow 2674 (Ws).

AEGIPHILA CHRYSANTHA Hayek

Additional synonymy: Aegiphila chrysantha Mayek ex Mold., *Phytologia* 52: 127, in syn. 1982.

Additional bibliography: Mold., *Phytol. Mem.* 2: 126, 131, 137, 173, 370, & 519. 1980; Mold., *Phytologia* 46: 321 (1980), 50: 246

(1982), and 52: 127. 1982.

Recent collectors refer to this plant as a scandent vine or sprawling shrub, 1.5 m. tall, with green fruiting-calyxes, yellow flower-buds, and vermillion fruit, and have found it growing in cacao plantations and on riverbanks, at 50—100 m. altitude, in anthesis in March and in fruit in July. The corollas are said to have been "yellow-white" on Escobar 795.

Additional citations: ECUADOR: El Oro: Escobar 795 (Ld). PERU: Loreto: Gentry, Ayala, Diaz, & Jaramillo 21722 (N). BRAZIL: Bahia: Belém 1436 (N); Hage 236 (Ld), 565 (Ld); Hage & Santos 1098 (Ld); Hage, Santos, & Vinha 516 (Ld); Mattos Silva & Ribeiro 407 (N).

AEGIPHILA CHRYSANTHA var. GLABRA Mold.

Additional bibliography: Mold., *Phytologia* 40: 213. 1978; Mold., *Phytol. Mem.* 2: 131 & 519. 1980.

AEGIPHILA CONTURBATA Mold.

Additional bibliography: Mold., *Phytologia* 25: 297. 1973; Mold., *Phytol. Mem.* 2: 137 & 519. 1980.

AEGIPHILA CORDATA Poepp.

Additional synonymy: Aegiphila villosissima Mold., *Bull. Torrey Bot. Club* 60: 392—393. 1933. Aegiphila cordata var. villosissima (Mold.) Mold., *Phytologia* 25: 298. 1973.

Additional bibliography: Bocq. in *Baill., Rec. Obs. Bot.* 3: 190. 1863; J. A. Clark, *Card-Ind. Gen. Sp. Var. Pl.* 1933; Mold., *Bull. Torrey Bot. Club* 60: 392—393. 1933; Mold., *Brittonia* 1: 252, 254, 255, 259, 277, 442—445, 474, & 475. 1934; A. W. Hill, *Ind. Kew. Suppl.* 9: 6. 1938; Mold., *Phytologia* 1: 296. 1938; Mold., *Geogr. Distrib. Avicenn.* 23—25. 1939; Fedde & Schust., *Justs Bot. Jahresber.* 60 (2): 569. 1941; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 1, 34—36, 84, & 85. 1942; Mold., *Alph. List Cit.* 2: 621. 1948; H. N. & A. L. Mold., *Pl. Life* 2: 46. 1948; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 2, 58, 71, 74, 75, 175, & 184. 1949; *Angely, Ind. Ang.* 10. 1959; Mold., *Résumé* 81, 85, 86, 228, 440, & 442. 1959; Mold., *Phytologia* 8: 16 & 20. 1961; Mold., *Fifth Summ.* 1: 138, 144, 146, & 378 (1971) and 2: 845 & 848. 1971; Mold., *Phytologia* 27: 375 (1973) and 34: 257. 1976; Mold., *Phytol. Mem.* 2: 105, 131, 137, & 519. 1980; Mold., *Phytologia* 47: 135 (1980), 50: 12 (1981), and 50: 244, 246, 247, 256, & 268. 1982.

Recent collectors describe this species as a tree, 5—6 m. tall, a shrub, 5 m. tall, or a vine or liana, the stems 2.5 cm. in diameter at breast height, with "a rich brown to golden pubescence", and with yellow or orange fruit, and have found it growing in clay soil of mata, in pluvial forests, and in forest margins, at 80—180 m. altitude, in flower in July and October, and in fruit in April, October, and December. The corollas are said to have been "cream"-color on Huashikat 963 and "greenish-yellow" on Mathias & Taylor 5606.

Material of A. cordata has been misidentified and distributed in some herbaria as Cordia sp.

Additional & emended citations: COLOMBIA: Chocó: Gentry, Mulamy, Hikes, Libenson, Olson, & Cagallo 30117 (Ld). PERU: Amazonas: Huashikat 784 (Lc), 963 (Lc); Tunqui 359 (Ld). Huánuco: Flowman 5816 (Ld). Loreto: Mathias & Taylor 5606 (W-2653158). BRAZIL: Acre: Prance, Maas, Kubitzki, Steward, Ramos, Pinheiro, & Lima 11828 (Ld, N). Mato Grosso: Krukoff 1400 (A, B, Em, Ca, Cb, E, K, Ld--photo, Ld--photo Ld--photo, Mi, N, N--photo, N--photo, N--photo, P, S, Ut, W--photo). Rondônia: Viera, Zaruchi, Petersen, Ramos, & Mota 572 (N).

AEGIPHILA CORDATA var. BREVIPILOSA Mold., Phytologia 50: 12. 1981.
Bibliography: Mold., Phytologia 50: 12 (1981) and 50: 244 & 268. 1982.

This taxon, including its type collection, was previously regarded by me and cited as representing var. colombiana Mold.

Emended citations: COLOMBIA: Valle: Cuatrecasas 13993 (N-type).

AEGIPHILA CORDATA var. COLOMBIANA Mold.

Additional bibliography: Mold., Phytol. Mem. 2: 105, 131, & 519. 1980; Mold., Phytologia 46: 321 (1980) and 50: 244. 1982.

AEGIPHILA CORDATA var. VILLOSISSIMA (Mold.) Mold.

This taxon is now regarded as being identical with typical A. cordata Poepp.

AEGIPHILA CORDIFOLIA (Ruiz & Pav.) Mold.

Additional bibliography: Walp., Repert. Bot. Syst. 4: 130-131. 1845; Mold., Phytol. Mem. 2: 131 & 519. 1980; Mold., Phytologia 47: 45. 1980.

Recent collectors have found this apparently rare plant in moist premontane forests, at 220 m. altitude, describing it as a shrub, 3 m. tall, in flower in January. They describe the color of the corollas as "white".

Additional citations: PERU: Madre de Dios: Gentry & Revilla 16363 (Ld).

AEGIPHILA CORIACEA Mold.

Additional bibliography: Mold., Phytologia 25: 299. 1973; Mold., Phytol. Mem. 2: 137 & 519. 1980.

AEGIPHILA COSTARICENSIS Mold.

Additional bibliography: Mold., Phytol. Mem. 2: 59, 70, 78, 80, 82, 113, 370, & 519. 1980; F. C. Seymour, Phytol. Mem. 1: 242. 1980; Mold., Phytologia 47: 45 (1980) and 52: 118 & 119. 1982.

Recent collectors describe this plant as a slender shrub, 1-2.5 m. tall, or slender brittle tree, 3-6 m. tall, the leaves slightly paler beneath, the flowers "dangling", the pedicels and calyx light-purple, and the fruit at first green, later bright-blue. They have found the plant growing in primary forests, wet lowland and wet cloud-forests, on riverbanks, and along trailsides, at 50-

1200 m. altitude, in flower in March and December, and in fruit in February, March, and May. The corollas are said to have been "white" on Folsom & al. 7074, Hartman 12054, and Liesner & González 10762.

Material of this species has been misidentified and distributed in some herbaria as Malpighiaceae sp. On the other hand, the Gentry & Mori 13802, distributed as A. costaricensis, actually is A. pauciflora Standl.

Additional citations: MEXICO: Veracruz: Gentry, Lott, & Botany Class 32366 (Ld). PANAMA: Coclé: Folsom, Channell, & Small 7074 (Ld). Darién: Hammel 1231 (Ld), 1313 (Ld); R. L. Hartman 12054 (Ld). VENEZUELA: Táchira: Liesner & González 10762 (Ld), 10933 (Ld).

AEGIPHILA COWANI Mold.

Additional bibliography: Mold., *Phytologia* 46: 322. 1980; Mold., *Phytol. Mem.* 2: 121 & 519. 1980.

AEGIPHILA CRENATA Mold.

Additional bibliography: Mold., *Phytologia* 27: 291. 1973; Mold., *Phytol. Mem.* 2: 137 & 519. 1980; Mold., *Phytologia* 50: 247. 1982.

Recent collectors describe this plant as a tree or treelet, 1-4 m. tall, the [immature] fruit green, and have found it growing on campo cerrado and on "savannas dominated by Axonopus sp., Bulbo-stylis paradoxa, and Curatella americana, the trees and shrubs widely spaced as single individuals and with surrounding forest". They have found it in fruit in February and March.

Material of this species has been misidentified and distributed in some herbaria as A. parviflora Mold.

Additional citations: BRAZIL: Mato Grosso: Silva & Pinheiro 4416 (N). Pará: Davidse, Rosa, Rosário, & Silva 17648 (N).

AEGIPHILA CUATRECASASI Mold.

Additional bibliography: Mold., *Phytol. Mem.* 2: 105, 370, & 519. 1980; Mold., *Phytologia* 46: 322. 1980.

AEGIPHILA CUATRECASASI var. NITIDA Mold.

Additional bibliography: Mold., *Phytologia* 46: 322. 1980; Mold., *Phytol. Mem.* 2: 131 & 519. 1980.

AEGIPHILA CUNEATA Mold.

Additional bibliography: Mold., *Phytol. Mem.* 2: 126, 131, 137, 370, & 519. 1980; Mold., *Phytologia* 47: 45. 1980.

Recent collectors describe this plant as a shrub or low tree, 2-3 m. tall, the young twigs and leaves with magenta hairs, and have encountered it in forests and near rivers, at 350 m. altitude, flowering in August. The corollas are said to have been "white" on Foster 2487 and on Foster & Augspurger 3090.

Additional citations: PERU: Madre de Dios: R. B. Foster 2487

(W--2888878), 6633 (W--2888645); Foster & Augspurger 3090 (W--2888876).

AEGIPHILA CUNEATA var. **HIRSUTISSIMA** Mold.

Additional bibliography: Mold., *Phytologia* 40: 215. 1978; Mold., *Phytol. Mem.* 2: 131 & 519. 1980.

AEGIPHILA DENTATA Mold.

Additional bibliography: Mold., *Phytologia* 27: 291. 1971; Mold., *Phytol. Mem.* 2: 137 & 520. 1980.

AEGIPHILA DEPPEANA Steud.

Additional synonymy: Aegophylla deppeana Steud. ex Mold., *Phytologia* 52: 127, in syn. 1982.

Additional bibliography: Cham., *Linnaea* 7: 110. 1832; Mold., *Phytol. Mem.* 2: 59, 70, 78, 80, 82, 105, 113, 135, 344, 370, & 520. 1980; F. C. Seymour, *Phytol. Mem.* 1: 242. 1980; Mold., *Phytologia* 47: 45 (1980), 50: 244 (1982), and 52: 115 & 119. 1982.

Recent collectors describe this plant as a shrub, 1.5 m. tall, or a climbing perennial vine, 3 m. long, and have encountered it at the edges of potreros with Gliricidia and Delonix, at 500--1000 m. altitude, in flower in March and November, and in fruit in September. Calderón refers to it as an "abundant perennial vine", at 6 m. altitude, the [immature] fruit green in December.

The corollas are said to have been "cream"-color on Liesner & González 10702 and "yellowish-white" on Ramos & Cowan 2700. A wood specimen accompanies Stern & al. 1828.

Material of this species has been misidentified and distributed in some herbaria as A. hoehnei Mold.

Additional citations: MEXICO: Tabasco: Ramos & Cowan 2700 (N). Veracruz: Calderón 1221 (Me--153956). PANAMA: Los Santos: Stern, Eyde, & Ayensu 1828 (Mi). COLOMBIA: Chocó: Forero & Jaramillo 2505 (N). VENEZUELA: Táchira: Liesner & González 10702 (Ld).

AEGIPHILA DUCKEI Mold.

Additional bibliography: Mold., *Phytol. Mem.* 2: 137 & 520. 1980; Mold., *Phytologia* 46: 322. 1980.

AEGIPHILA ELATA Sw.

Additional & emended bibliography: J. F. Gmel. in L., *Syst. Nat.*, ed. 13, imp. 2, 2: 42 & 259. 1791; Sweet, *Hort. Brit.*, ed. 2, 416. 1830; G. Don in Sweet, *Hort. Brit.*, ed. 3, 550. 1839; Walp., *Repert. Bot. Syst.* 4: 118--119. 1845; Bocq. in Baill., *Rec. Obs. Bot.* 3: 190. 1863; Briq. in Engl. & Prantl, *Nat. Pflanzenfam.*, ed. 1, 4 (3a): 166. 1895; J. T. & R. Kartesz, *Syn. Checklist Vasc. Fl.* 2: 465. 1980; Mold., *Phytol. Mem.* 2: 21, 59, 70, 73, 75, 78, 80, 82, 87, 92, 101, 103, 105, 113, 121, 124, 125, 344, 369--372, 399, 412, & 520. 1980; F. C. Seymour, *Phytol. Mem.* 1: 242. 1980; Mold., *Phytologia* 47: 45 & 50 (1980) and 52: 116 & 118. 1982.

Chamisso (1832) identifies an unnumbered Sellow collection from tropical Brazil as this species, but A. elata is not known to me from Brazil.

Recent collectors refer to A. elata as a shrub, 2 m. tall, or as a liana, the leaves "deep-green above, more olive beneath", the corolla dull yellow-green (Saunders 451), the "lobed style protruding beyond the corolla", the flowers not aromatic, the fruiting-calyx green and "cupped", and the fruit orange when ripe. They have found it growing in disturbed primary forests, as well as on pine and grass llanos, in fruit in July and September.

Material of this species has been misidentified and distributed in some herbaria as A. paniculata Mold.

The corollas are said to have been "whitish" on Liogier & Liogier 27502.

Additional citations: BELIZE: Wiley 3 (Ne--159886). HONDURAS: Colón: Saunders 451 (E--2889924). Gracias a Díos: Nelson & Nelson 4194 (Ld). COSTA RICA: Puntarenas: Liesner 2191 (Ld). PANAMA: Chiriquí: Correa, Dressler, Salazar, Mendieta, Garibaldi, Farnum, & Béliz 2709 (E--2904987). HISPANIOLA: Dominican Republic: Liogier & Liogier 27502 (N). VENEZUELA: Apure: Geay s.n. [1893-4] (P).

AEGIPHILA ELATA var. MACROPHYLLA (H.B.K.) López-Palacios

Additional bibliography: Mold., *Phytol. Mem.* 2: 103, 105, 113, 370--372, 399, & 520. 1980; Mold., *Phytologia* 46: 323 (1980) and 47: 50. 1980.

AEGIPHILA ELEGANS Mold.

Additional bibliography: Mold., *Phytol. Mem.* 2: 106, 126, 131, 137, 173, & 520. 1980; Mold., *Phytologia* 46: 324 (1980) and 50: 246. 1982.

Recent collectors have encountered this plant in secondary forests and on lateritic soil in mature and non-inundated forests, at 140--600 m. altitude, flowering in May and August, describing the plant as a climber, 5--6 m. long, or liana, the buds pale-green, the leaves yellowish-green and rugose, and the sepals pubescent. The corollas are said to have been "cream"-color on the Gentry & al. 29307 collection and "white" on their 29807 collection.

Additional citations: PERU: Loreto: Gentry, Vasquez, & Jaramillo 29807 (Ld); Gentry, Vasquez, Jaramillo, Andrade, & Stern 29307 (Ld). San Martín: Schunke Vigo 8479 (Ld).

AEGIPHILA ELONGATA Mold.

Additional bibliography: Mold., *Phytologia* 27: 353. 1973; Mold., *Phytol. Mem.* 2: 173 & 520. 1980.

The Rusby collection, cited below, is placed here tentatively, but probably represents this taxon, known thus far only from La Paz. It was collected at 4000 feet altitude and distributed in

herbaria as Malpighiaceae sp. and as Byrsonima lancifolia A. Juss.

Additional citations: BOLIVIA: La Paz: H. H. Rusby 2170 (Mi).

AEGIPHILA EXIGUIFLORA Mold.

Additional bibliography: Mold., Phytologia 40: 217. 1978; Mold., Phytol. Mem. 2: 137 & 520. 1980.

AEGIPHILA FALCATA Donn. Sm.

Additional bibliography: Mold., Phytol. Mem. 2: 59, 70, 75, 80, 82, 370, & 520. 1980; F. C. Seymour, Phytol. Mem. 1: 242. 1980; Mold., Phytologia 46: 324. 1980.

Recent collectors have encountered this plant at 50 m. altitude, flowering in July.

Material of the species has been misidentified and distributed in some herbaria as A. laxicupulis Mold.

Additional citations: GUATEMALA: San Marcos: German & al. 717 (Me--28264). COSTA RICA: Heredia: Solomon 5339 (Ld).

AEGIPHILA FARINOSA Mold.

Additional bibliography: Mold., Phytol. Mem. 2: 105 & 520. 1980; Mold., Phytologia 47: 45--46. 1980.

AEGIPHILA FASCICULATA Donn. Sm.

Additional bibliography: Mold., Phytol. Mem. 2: 70, 75, 78, & 520. 1980; Mold., Phytologia 47: 46. 1980; F. C. Seymour, Phytol. Mem. 1: 242. 1980.

AEGIPHILA FENDLERI Mold.

Additional bibliography: Mold., Phytol. Mem. 2: 113, 137, 370, & 520. 1980; Mold., Phytologia 47: 135. 1980.

AEGIPHILA FERRUGINEA Hayek & Spruce

Additional bibliography: Mold., Phytologia 46: 324--326. 1980; Mold., Phytol. Mem. 2: 126 & 520. 1980.

Mexia reports that the wood of this species is "excellent for cabinet work".

Additional citations: ECUADOR: Carchi: Mexia 7446 (W--1663865).

AEGIPHILA FILIPES Mart. & Schau.

Additional bibliography: Mold., Phytologia 47: 46. 1980; Mold., Phytol. Mem. 2: 82, 105, 113, 131, 137, 173, 370, & 520. 1980.

Folsom & Maas describe the corolla of this plant as "green", the stamens white, and encountered it at 300--500 m. altitude, flowering in September. It was distributed as Solanaceae sp.

The Steyermark & al. 125867, distributed as A. filipes, actually is A. glandulifera var. paraensis Mold.

Additional citations: PANAMA: Panamá: Folsom & Maas 5220 (E--2889949).

AEGIPHILA FLORIBUNDA Moritz & Mold.

Additional bibliography: Mold., Phytologia 46: 325. 1980; Mold.,

Phytol. Mem. 2: 113, 370, & 520. 1980.

AEGIPHILA FLUMINENSIS Vell.

Additional & emended bibliography: Walp., Repert. Bot. Syst. 4: 120. 1845; Bocq. in Baill., Adansonia, ser. 1, 3 [Rec. Obs. Bot.]: 190. 1862; Bocq., Rev. Verbenac. 190. 1863; Mold., Phytologia 47: 46. 1980; Mold., Phytol. Mem. 2: 137, 372, & 520. 1980.

Recent collectors describe this plant as a small tree, 2 m. tall, and have found it growing in slightly disturbed primary forests, at 50 m. altitude, in flower in May. The corollas are said to have been "cream"-color on the Mori & Boom collection cited below.

Additional citations: BRAZIL: Bahia: Mori & Boom 14123 (Mi, N).

AEGIPHILA FOETIDA Sw.

Additional & emended bibliography: J. F. Gmel. in L., Syst. Nat., ed. 13, imp. 2, 2: 42 & 259. 1791; G. Don in Sweet, Hort. Brit., ed. 3, 550. 1839; Walp., Repert. Bot. Syst. 4: 122. 1845; Bocq. in Baill., Adansonia, ser. 1, 3 [Rec. Observ. Bot.]: 190. 1862; Ekman, Arkiv Bot. Stockh. 22A: 109. 1929; Mold., Phytologia 40: 220. 1978; Mold., Phytol. Mem. 2: 92, 344, & 520. 1980.

AEGIPHILA FROESI Mold.

Additional bibliography: Mold., Phytologia 40: 220. 1978; Mold., Phytol. Mem. 2: 137 & 520. 1980.

AEGIPHILA GLABRATA Mold.

Additional bibliography: Mold., Phytologia 40: 220. 1978; Mold., Phytol. Mem. 2: 131 & 520. 1980.

AEGIPHILA GLABRATA f. MACROPHYLLA Mold., Phytologia 52: 230. 1982.

Bibliography: Mold., Phytologia 52: 230. 1982.

Citations: PERU: Loreto: France, Hill, Pennington, & Ramos 24086 (N-type).

AEGIPHILA GLANDULIFERA Mold.

Additional bibliography: Mold., Phytol. Mem. 2: 80, 82, 105, 113, 125, 126, 131, 137, 369, 370, & 520. 1980; Mold., Phytologia 47: 135--137. 1980.

Recent collectors have found this plant growing in forests and swampy depressions on level terrain, in low riverine woods, and in secondary inundated forests, at 30--1200 m. altitude, in flower in March, August, September, and November, and in fruit in August, September, and November. They describe it as a tree, 3 m. tall, shrub, 1--3 m. tall, or scandent vine, the inflorescence pendent, the flower-buds greenish, and the fruit at first green, then yellowish. The corollas are described as having been "white" on Liesner & González 10861 and Revilla 1050, while on Cid & al. 2121 it is stated that the corollas were "greenish, stamens white".

Additional citations: VENEZUELA: Táchira: Liesner & González 10861 (Ld); Steyermark, Liesner, & González 120452 (E--2774724).

PERU: Loreto: Revilla 1050 (N); Vásquez, Jaramillo, & Stern 432 (Ld). BRAZIL: Pará: Cid, Ramos, Mota, & Rosas 2121 [Herb. FEEMA. 96360] (N, N), 2302 [Herb. Inst. Nac. Pesq. Amaz. 96650] (Ld). Roraima: Prance, Dobzhansky, & Ramos 19943 (N).

AEGIPHILA GLANDULIFERA var. PARAËNSIS Mold.

Additional bibliography: Mold., *Phytol. Mem.* 2: 113, 137, & 520. 1980; Mold., *Phytologia* 47: 46. 1980.

Additional citations: VENEZUELA: Amazonas: Steysmark, Guariglia, Holmgren, Luteyn, & Mori 125867 (Ld).

AEGIPHILA GLANDULIFERA var. PERUVIANA Mold.

Additional bibliography: Mold., *Phytol. Mem.* 2: 131 & 520. 1980; Mold., *Phytologia* 46: 326. 1980.

AEGIPHILA GLANDULIFERA var. PYRAMIDATA L. C. Rich. & Mold.

Additional bibliography: Mold., *Phytologia* 47: 46—47. 1980; Mold., *Phytol. Mem.* 2: 106, 113, 125, 137, 369, 370, & 520. 1980.

AEGIPHILA GLEASONII Mold.

Additional bibliography: Mold., *Phytologia* 25: 316. 1973; Mold., *Phytol. Mem.* 2: 121 & 520. 1980.

AEGIPHILA GLOMERATA Benth.

Additional bibliography: Walp., *Ann. Bot. Syst.* 1: 544. 1849; Mold., *Phytologia* 46: 326. 1980; Mold., *Phytol. Mem.* 2: 126, 130, & 520. 1980.

The Dodsons describe this plant as a rare tree, 5 m. tall, with "green flowers", and encountered it at 40—80 m. altitude, flowering in September.

Additional citations: ECUADOR: Guayas: Dodson & Dodson 11519 (Ld).

AEGIPHILA GLORIOSA Mold.

Additional bibliography: Mold., *Phytologia* 47: 47. 1980; Mold., *Phytol. Mem.* 2: 137 & 520. 1980.

Additional citations: BRAZIL: Bahia: Mori, Silva, Kallunki, Santos, & Santos 9723 (N).

AEGIPHILA GLORIOSA var. PARAËNSIS Mold.

Additional bibliography: Mold., *Phytol. Mem.* 2: 137, 370, & 520. 1980; Mold., *Phytologia* 47: 47. 1980.

AEGIPHILA GOELDIANA Huber & Mold.

Additional bibliography: Mold., *Phytologia* 25: 316. 1973; Mold., *Phytol. Mem.* 2: 137 & 520. 1980.

AEGIPHILA GRANDIS Mold.

Additional bibliography: Mold., *Phytol. Mem.* 2: 106, 113, 126, 369—372, & 520. 1980; Mold., *Phytologia* 46: 327 (1980) and 52:

119. 1982.

Recent collectors describe this plant as a treelet, 4 m. tall, and found it growing in woods, at 630—830 m. altitude, in fruit in March.

Additional citations: COLOMBIA: Chocó: Forero, Jaramillo, Es-pina Z., & Palacios H. 6933 (Ld).

AEGIPHILA GRANDIS var. *CUATRECASASI* (Mold.) López-Palacios

Additional bibliography: Mold., *Phytol. Mem.* 2: 106, 370, 371, & 520. 1980; Mold., *Phytologia* 46: 327. 1980.

AEGIPHILA GRANDIS var. *SESSILIFLORA* (Mold.) Mold.

Additional bibliography: Mold., *Phytologia* 46: 327. 1980; Mold., *Phytol. Mem.* 2: 106, 371, & 520. 1980.

AEGIPHILA GRAVEOLENS Mart. & Schau.

Additional bibliography: Mold., *Phytol. Mem.* 2: 137, 370, & 520. 1980; Mold., *Phytologia* 46: 327. 1980.

Hoehne describes this plant as a subshrub, 3.5 m. tall, while Santos and his associates refer to it as an "herb", 1.3 m. tall, with "greenish flowers" in February.

Additional citations: BRAZIL: Bahia: Anderson, Stieber, & Kirkbride 36779 (N); Santos, Mattos Silva, & Brito 3441 (N). Rio de Janeiro: W. Hoehne 6011 [*Herb. Inst. Bot. S. Paulo* 119179] (N).

AEGIPHILA HASSLERI Briq.

Additional synonymy: *Aegiphylla hassleri* Briq. ex Mold., *Phytologia* 50: 256, in syn. 1982.

Additional bibliography: Mold., *Phytol. Mem.* 2: 137, 176, 180, 184, 344, 371, & 520. 1980; Mold., *Phytologia* 47: 44 & 47 (1980) and 50: 356. 1982.

Recent collectors describe this species as a small tree, 4 m. tall, the obovoid immature fruit green in October. They have encountered the plant along roadsides in mixed subtropical forests, at 600 m. altitude.

The Krapovickas & al. 24311, distributed as *A. hassleri*, seems better regarded as representing *A. brachiata* Vell., a very closely related taxon.

Additional citations: ARGENTINA: Misiones: Renvoize 3253 (W—2902876).

AEGIPHILA HASTINGSIANA Mold.

Additional bibliography: Mold., *Phytologia* 25: 319. 1973; Mold., *Phytol. Mem.* 2: 70 & 520. 1980.

AEGIPHILA HAUGHTII Mold.

Additional bibliography: Mold., *Phytol. Mem.* 2: 127, 131, & 520. 1980; Mold., *Phytologia* 47: 135 (1980), 48: 438 (1981), and 50: 246 & 268. 1982.

Foster describes this plant as a shrub, 4 m. tall, with red "receptacles", and found it growing in forests, fruiting in August. Tunqui refers to it as a tree, 5 m. tall, with "green flowers", and encountered it at 200 m. altitude, flowering in February, reporting for it the vernacular name, "tsaanumi kumpari". Material has been misidentified and distributed in some herbaria as A. filipes Mart. & Schau.

Additional citations: PERU: Amazonas: Tunqui 751 (Ld). Madre de Dios: R. B. Foster 2482 (W--2888877), 2692 (W--2888993).

AEGIPHILA HAUGHTII var. SERRATIFOLIA Mold., Phytologia 48: 438. 1981.

Bibliography: Mold., Phytologia 48: 438 (1981) and 50: 246 & 268. 1982.

Citations: PERU: Madre de Dios: Terborgh & Foster 6525 (W--2888644--type).

AEGIPHILA HERZOGII Mold.

Additional bibliography: Mold., Phytologia 27: 353. 1973; Mold., Phytol. Mem. 2: 173 & 520. 1980.

Krapovickas & Schinini describe this plant as 2 m. tall, with orange-colored fruit, and have found it growing in sandy soil, in both flower and fruit in April, the corollas described as having been "yellow".

Additional citations: BOLIVIA: Santa Cruz: Krapovickas & Schinini 36130 (Ld).

AEGIPHILA HIRSUTA Mold.

Additional bibliography: Mold., Phytol. Mem. 2: 173 & 520. 1980; Mold., Phytologia 46: 327--328. 1980.

AEGIPHILA HIRSUTA var. COLOMBIANA Mold.

Additional bibliography: Mold., Phytologia 46: 327--328. 1980; Mold., Phytol. Mem. 2: 106 & 520. 1980.

AEGIPHILA HIRSUTISSIMA Mold.

Additional bibliography: Mold., Phytol. Mem. 2: 82, 106, 113, & 520. 1980; Mold., Phytologia 46: 328 (1980), 50: 246 (1982), and 52: 120. 1982.

Recent collectors refer to this plant as a shrub, 2--2.5 m. tall, or a small tree, with a trunk diameter of 4 cm., "the stems green-cream with white hairs, lenticels cream," the leaves membranous in texture, deep-green and glossy above, dull paler green or "dark-green with white hairs and punctate beneath, peduncles green, with white hairs, sepals green with white hairs, petals and anthers cream, filaments white, style and stigma cream", the fruit at first pale-green, later deep-orange in color. They have encountered the plant around waterfalls in virgin evergreen forests, at 20--1500 m. altitude, flowering in March & October, in fruit in March. Berti & Peña describe the calyx as green and the corolla as "cream"-color, and found it in anthesis in October. [to be continued]

A NEW SPECIES OF BRICKELLIA (ASTERACEAE)

FROM NORTHCENTRAL MEXICO

B. L. Turner

Department of Botany, University of Texas, Austin, TX 78712

Collections from the Chihuahuan Desert region of northcentral Mexico by Dr. M. C. Johnston and his colleagues continue to yield a number of previously undescribed taxa. The new Brickellia described below is apparently confined to the Del Carmen Mountains of Mexico, which is a prominent range about 2500 m in elevation readily visible from the north side of the Rio Grande River, in the Big Bend region of Texas.

BRICKELLIA STOLONIFERA, B. L. Turner, sp. nov.

B. simplex Gray simulans sed valde distinguibilis capitulescentiis terminalibus, foliis plerumque oppositis, caulibus pro parte stoloniformibus.

Erect, perennial herbs, 20-50 cm tall, with delicate stolons, stems puberulent, 1-3 mm in diameter. Leaves predominately opposite; petioles 1.5-3.5 mm long; blades 2.5-9.0 cm long, 1.5-6.5 cm wide, deltoid-cordate, coarsely and irregularly dentate, sparsely pubescent below, mainly along the veins, moderately to sparsely glandular-punctate beneath. Heads broadly turbinate to campanulate in a terminal 1-4 headed capitulescence. Involucre 12.0-13.5 mm long, the bracts 50-60, chartaceous, spreading at maturity; the outermost ovate, apiculate to awned, variously puberulent, the remainder, linear-lanceolate, ciliate. Corolla 7.5-8.0 mm long, tubular throughout, somewhat constricted below the lobes, glabrous; lobes acute, ca 0.4 mm long, glabrous to sparsely strigose, especially above; pappus of 30-40, white, delicate, ciliate bristles, 5-8 mm long.

TYPE: MEXICO, Coahuila: W slope of Sierra del Jardin, E of Rancho Caballo (29° 03' N x 102° 38' W), 1400-2250 m, steep slopes of igneous rock, coarse sandy and gravelly soil, Quercus-Nolina-Dasyliroium community; 16 Sep 1972, Chiang, Wendt & Johnston 9299 (Holotype LL; isotype MEXU).

Additional collections: MEXICO. Coahuila: Del Carmen Mountains, 26 Aug 1936, Marsh 598 (TEX); N slopes of Picacho del Centinela, Del Carmen Mts., 24 Aug 1953, B. H. Warnock 11597 (TEX).

This taxon will key to the Chihuahuan species, Brickellia simplex, in Robinson's (1917) treatment of the genus, but is

amply distinct in habit, capitulescence and leaf arrangement. B. stolonifera has a terminal cluster of 1-4 heads while those of B. simplex are lateral, each arising from shortened nodes along the upper stem; B. stolonifera has predominately opposite leaves while those of B. simplex are mostly alternate, much as in the related, widespread, B. grandiflora (Hook.) Nutt., which has heads and florets quite different from both B. simplex and B. stolonifera.

Literature Cited

Robinson, B. L. 1917. A monograph of the genus Brickellia. Mem. Gray Herb. 1: 1-151.

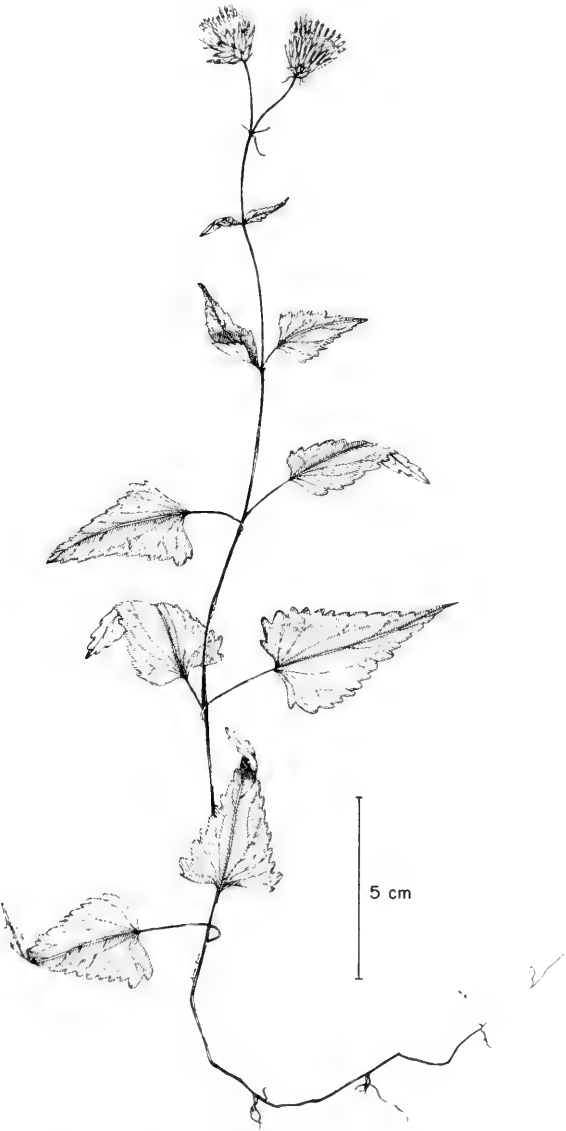


Fig 1. Brickellia stolonifera (holotype)

EINE "NEUE" ANDROSACE-ART:

Androsace studiosorum A. Kress, spec. "nov." (Androsace primuloides)

Alarich Kress, Edelweiss-Str. 9, D-8038 Gröbenzell, B. R. Deutschland (West Germany)

Androsace studiosorum A. Kress: Plantae perennes, foliis numerosis, rosulatis, dimorphis, aequaliter albivillosis, sarmentis elongatis, scapis umbelliferis.

Plantae florentes foliis diversis: Folia inferiora, autumnalia parva, numerosa, plus minusve lanceolata, 0,6 usque 1,2 cm longa et 1,5 usque 2,5 mm lata; folia superiora, nova pauca, (4 usque 10), maiora, 1,5 usque 4,5 cm longa et usque 7,5 mm lata, laminis oblanceolatis (anguste obovatis), in petiolum breve vel elongatum, alatum angustatis. Plantae aestivales sine foliis hiemalibus parvis, sed foliis maioribus numerosis. Plantae florentes sarmentis compluribus (usque ad 7), longis (usque ad 19 cm), (non compressis) vix 1 mm crassis, atropurpureis. Rosulae sarmentorum foliis late lanceolatis, accrescentibus. Scapi floriferi 6 usque 14,5 cm longi, 9- usque 18-flori. Bractee oblanceolatae, 6,5 usque 12 mm longae et 1,3 usque 2,8 mm latae, basin pedicellorum amplexantes. Pedicelli 0,9 usque 2,2 cm longi. Calyces campaniformes, 2,9 usque 3,8 mm longi, ad medium in quinque lobos lanceolati-triangulares divisi. Corollae hypocraterimorphae, ca. 12,5 mm diametro, roseae, sed fauce lutea vel rubra. Folia sarmenta juvenilia, scapi, pedicelli et calyces villosi, margines foliorum dense villosi, sarmenta glabrescentia. Pili longiores foliorum usque ad 2 (2,5) mm longi; pili bractearum pedicellarumque subaequilongii; pili scaporum sarmentorumque paulo longiores.

Androsace studiosorum differt ab A. sarmentosa, cui similis, pilis inflorescentiae albidis, non brunnescentibus, foliis subaeque villosis (non partim subglabris), maioribusque (cfr. Handel-Mazzetti, 1927). A. primuloides Duby (1844), non Moench (1802) nec D. Don (1825) probabiliter, A. primuloides auct. certe (partim?) ad A. studiosorum pertinet.

Typus: Kaschmir, Haramuk, Nunkal-See, leg. Feser: Specimen in Horto Botanico Monacensi sub numero 228/77 cultum et mense Maio 1982 asservatum: M. Isotypi: specimina eiusdem originis, sub numeris 206/77, 208/77 et 228/77 in Horto Botanico Monacensi culta et 1981 vel 1982 ibi ab A. Kress collecta: LAU, M, P, W.

Nach den Nomenklaturregeln sind jüngere Homonyme illegitim, selbst wenn ihre Vorgänger illegitim sind. Eine Konservierung des Namens Androsace primuloides wäre wünschenswert, ist aber beim gegenwärtigen Stand der Regelung nicht möglich (vgl. Taxon 30 [1981] 910, Fußnote 5). Eine Typisierung der Androsace primuloides ist deshalb, genau genommen, nur von historischem Interesse. Sie kann zu einem späteren Zeitpunkt, bei günstiger Gelegenheit nachgeholt werden.

Die Art ist den Amateurbotanikern gewidmet, den großen wie den kleinen und unbekannten.

Literatur:

Don, D.: Prodrum florae nepalensis London (1825) p. 81

Duby, F. E. in A. P. de Candolle: Prodrum systematis regni vegetabi-

lis ..., VIII. Paris (1844) p. 51

Handel-Mazzetti, H.: A revision of the Chinese species of *Androsace* with remarks on other Asiatic species. Notes Roy. Bot. Garden Edinburgh 15 (1925-1927) p. 259-298

Knuth, R. in A. Engler: Das Pflanzenreich ..., IV, 237. Leipzig (1905)

Moench, K.: *Methodus plantarum Horti Bot. ...*, Supplementum. Marburg (1802)

ZUR NOMENKLATUR DER ANDROSACE CARNEA AUCT.

Alarich Kress, Botanischer Garten München, Menzinger Strasse 65, D-8000 München 19, B. R. Deutschland (West Germany)

In meinen "Primulaceen-Studien I" (Kress, 1981) habe ich den Namen Androsace carnea weitgehend gemieden. Ich hoffte damals, den komplexen Sachverhalt in Kürze mit der nötigen Ausführlichkeit darstellen zu können. Da widrige Umstände die geplante Veröffentlichung stärker verzögern als erwartet, möchte ich zwischendurch den Grund meiner Zurückhaltung wenigstens andeuten: Linnes Androsace carnea ist anscheinend nicht mit der Androsace carnea s. str. der Autoren identisch. Das zuständige Gremium könnte deshalb den Namen Androsace carnea verwerfen. Ich halte es deshalb für zweckmäßig, den Namen Androsace carnea bis zu einer entsprechenden Entscheidung zu vermeiden und ihn nicht in einem ursprünglichen Sinn zu verwenden, weil ich sonst Mißverständnisse herbeiführe, die sich vielleicht vermeiden lassen.

Androsace adfinis Biroli ssp. brigantiaca (Jordan et Fourr.) A. Kress var. parcedentata A. Kress ist bislang ohne "Gegenstück". Nach der derzeit gültigen Fassung des Internationalen Codes der Botanischen Nomenklatur muß der Name eines derartigen Taxons in einem solchen Fall eigens gebildet werden, was hiermit nachgeholt werden soll:

Androsace adfinis Biroli ssp. brigantiaca (Jordan et Fourr.) A. Kress var. brigantiaca (Jordan et Fourr.) A. Kress, **comb. nov.**
Basionym: Androsace brigantiaca Jordan et Fourreau: *Breviarium plantarum novarum ...* 2, Paris (1868) p. 205

Literatur:

Kress, A.: Primulaceen-Studien I, Gröbenzell bei München (1981)

SOME NAME-CHANGES FOR HEDGE BAMBOOS

Chia Liang-chi*, Fung Hok-lam*, and Paul Pui-Hay But**

*South China Institute of Botany, Academia Sinica, Guangzhou, China

**The Chinese University of Hong Kong, Shatin, N.T., Hong Kong

The subtropical Chinese Hedge Bamboo and its many varieties and cultivars are favorites in horticulture. The dwarf variety, Chinese Goddess Bamboo, has solid culms of 1-3 m high and 3-5 mm in diameter. Its leafy branches are always arched in bow-form, each bearing 13-23 leaves. These leaves are mostly 16-32 mm long and 2.6-6.5 mm wide. The typical form, however, may reach a height of 10 m and a diameter of 4 cm, with leaves 5-16 cm long and 7-16 mm wide. The variegated cultivars range from those with green culms bearing cream-colored stripes as in 'Silverstripe' to orange-yellow culms with green stripes as in 'Alphonse Karr' and to yellowish-reddish culms with green stripes in 'Stripestem Fernleaf'. Hence they offer a wide spectrum of heights, leaf sizes, and variegation for screens, single clump ornamentals, and even bonsai. Their compact clumps and dense branches make them also a good choice for hedges. Moreover, they are the most cold-resistant unicaespitose bamboos in cultivation, capable of surviving in temperatures down to -7°C .

The ornamental value and other desirable qualities of Hedge Bamboos have long attracted the admiration of gardeners and plant collectors. They were thus widely propagated in the Old World and, since around the turn of this century, also in the New. In fact, they are by far the commonest tuft bamboos cultivated in the South Atlantic and Gulf States and in southern California (Young & Haun 1961). As they expanded in distribution, they were also labelled with more superfluous names.

The commonest binomial currently in use for Hedge Bamboo in Chinese, Japanese and American literature is Bambusa multiplex (Loureiro) Raeuschel. This identification was made by Merrill (1923, 1935). However, Holttum (1956) argued convincingly that this binomial could not possibly apply to Hedge Bamboo and that the correct name should be Bambusa glaucescens (Willdenow) Siebold ex Munro. After careful comparison of our materials and available literature, we agree with Holttum, and thus find it necessary to make the following combinations, in anticipation of our reports on the bamboos of China (including Hong Kong).

1. Chinese Goddess Bamboo

Bambusa glaucescens (Willd.) Sieb. ex Munro var. riviereorum (R. Maire) Chia et H.L. Fung, comb. nov. --- Bambusa multiplex (Lour.) Raeuschel var. riviereorum R. Maire, Flore Afrique Nord 1:355. 1952. --- Bambusa scriptoria sensu A. et C. Riviere, Les Bambous 228. 1878, non Dennst. 1818.

2. Shimada Hedge Bamboo

Bambusa glaucescens (Willd.) Sieb. ex Munro var. shimadai (Hayata) Chia et But, comb. nov. --- Bambusa shimadai Hayata, Icon. Pl. Form. 6:59. 1916. --- Bambusa multiplex (Lour.) Raeuschel var. shimadai (Hayata) Sasaki, Trans. Nat. Hist. Soc. Form. 21:118. 1931. --- Leleba shimadai (Hayata) Nakai, Journ. Jap. Bot. 9:1. 1933.

3. Alphonse Karr Hedge Bamboo (Bambusa glaucescens 'Alphonse Karr')

Bambusa glaucescens (Willd.) Sieb. ex Munro cv. Alphonse Karr (Young) Chia et But, comb. nov. --- Bambusa multiplex (Lour.) Raeuschel var. Alphonse Karr Young, Nat'l Hort. Mag. 25:260, 264. 1946. --- Bambusa multiplex (Lour.) Raeuschel cv. Alphonse Karr Young, U.S.D.A. Agri. Handb. No. 193:40. 1961. --- Bambusa alphonso-karri Mitf. ex Satow, Trans. Asi. Soc. Jap. 27:91. pl. 3. 1899. --- Bambusa nana Roxb. var. normalis Makino ex Shirozawa f. alphonso-karri (Mitf ex Satow) Makino ex Shirozawa, Nippon Chiku-Bui Dzufu (Icon. Bamb. Jap.) 56. pl. 9. 1912. --- Bambusa nana Roxb. var. alphonso-karri (Satow) Marliac ex Camus, Les Bamb. 121. 1913. --- Bambusa multiplex (Lour.) Raeuschel f. alphonso-karri (Satow) Nakai, Rika Kyoiku 15: 67. 1932. --- Bambusa multiplex (Lour.) Raeuschel var. normalis Sasaki f. alphonso-karri Sasaki, Cat. Gov. Herb. (Formosa) 68. 1930. --- Bambusa glaucescens (Lam.) Munro ex Merr. f. alphonso-karri (Satow) Hatusima, Fl. Ryukyus 854. 1971. --- Leleba multiplex (Lour.) Nakai f. alphonso-karri (Satow) Nakai, Jour. Jap. Bot. 9:14. 1933.

4. Fernleaf Hedge Bamboo (Bambusa glaucescens 'Fernleaf')

Bambusa glaucescens (Willd.) Sieb. ex Munro cv. Fernleaf (Young) Chia et But, comb. nov., --- Bambusa multiplex (Lour.) Raeuschel var. Fernleaf Young, Nat'l Hort. Mag. 25:261, 266. 1946. --- Bambusa multiplex (Lour.) Raeuschel cv. Fernleaf Young, U.S.D.A. Agri. Handb. No. 193:40. 1961. --- Bambusa multiplex (Lour.) Raeuschel var. nana (Roxb.) Keng. f., Nat'l Forestry Res. Bur. China Tech. Bull. No. 8: 17. 1948, non Roxb. 1832.

Ischurochloa floribunda Büse ex Miquel, Fl. Jungh. 390. 1851. --- Bambusa floribunda (Büse) Zoll. et Maur. ex Steud., Syn. Pl. Gram. 330. 1854. --- Leleba floribunda (Büse) Nakai, Jour. Jap. Bot. 9:10. pl. 1. 1933.

Bambusa nana Roxb. var. gracillima Makino ex Camus, Les Bamb. 121. 1913, non Kurz. 1866.

Leleba elegans Koidz., Acta Phytotax. Geobot. 3:27. 1934. --- Bambusa multiplex (Lour.) Raeuschel var. elegans (Koidz.) Muroi, Sugimoto, New Keys Jap. Tr. 457. 1961.

5. Silverstripe Hedge Bamboo (Bambusa glaucescens 'Silverstripe')

Bambusa glaucescens (Willd.) Sieb. ex Munro cv. Silverstripe (Young) Chia et But, comb. nov., --- Bambusa multiplex (Lour.) Raeuschel var. Silverstripe Young, Nat'l. Hort. Mag. 25:260, 264. 1946. --- Bambusa multiplex (Lour.) Raeuschel cv. Silverstripe Young, U.S.D.A. Agri. Handb. No. 193:41. 1961.

Bambusa nana Roxb. var. variegata Camus, Les Bamb. 121. 1913. --- Bambusa multiplex (Lour.) Raeuschel f. variegata (Camus) Hatusima, Fl. Okinawa 128. 1967. --- Leleba multiplex (Lour.) Nakai f. variegata Nakai, Journ. Jap. Bot. 9:16. 1933.

6. Silverstripe Fernleaf Hedge Bamboo (Bambusa glaucescens 'Silverstripe Fernleaf')

Bambusa glaucescens (Willd.) Sieb. ex Munro cv. Silverstripe Fernleaf (Young) Chia et But, comb. nov. --- Bambusa multiplex var. Silverstripe Fernleaf Young, Nat'l. Hort. Mag. 25:261, 269. 1946. --- Bambusa multiplex (Lour.) Raeuschel cv. Silverstripe Fernleaf Young, U.S.D.A. Agri. Handb. No. 193:41. 1961.

Bambusa nana Roxb. f. albo-variegata Makino, Journ. Jap. Bot. 1:28. 1917. --- Bambusa floribunda (Büse) Zoll. et Maur. ex Steud. f. albo-variegata Nakai, Rika Kyoiku 15:66. 1932. --- Leleba floribunda (Büse) Nakai f. albo-variegata Nakai, Journ. Jap. Bot. 9:12. 1933. --- Bambusa multiplex (Lour.) Raeuschel var. elegans (Koidz.) Muroi f. albo-variegata (Makino) Muroi, Sugimoto, New Keys Jap. Tr. 457. 1961.

7. Stripestem Fernleaf Hedge Bamboo (Bambusa glaucescens 'Stripestem Fernleaf')

Bambusa glaucescens (Willd.) Sieb. ex Munro cv. Stripestem Fernleaf (Young) Chia et But, comb. nov. --- Bambusa multiplex (Lour.) Raeuschel var. Stripestem Fernleaf Young, Nat'l. Hort. Mag. 25:261. 1946. --- Bambusa multiplex (Lour.) Raeuschel cv. Stripestem Fernleaf Young, U.S.D.A. Agri. Handb. No. 193:41. 1961.

Bambusa nana Roxb. var. typica Makino ex Tsuboi f. viridi-striata Makino ex Tsuboi, Illus. Jap. Sp. Bamb. ed. 2. 44, pl. 45. 1916. --- Bambusa nana Roxb. f. viridi-striata Makino, Journ. Jap. Bot. 1:28. 1917. --- Bambusa floribunda (Büse) Zoll. et Maur. ex Steud. f. viridi-striata Nakai, Rika Kyoiku 15:66. 1932. --- Leleba floribunda (Büse) Nakai f. viridi-striata Nakai, Journ. Jap. Bot. 9:12. 1933. --- Bambusa multiplex (Lour.) Raeuschel var. elegans (Koidz.) Muroi f. viridi-striata (Makino ex Tsuboi) Muroi, Sugimoto, New Keys Jap. Tr. 457. 1961.

References

- Haubrich, R. 1981. Handbook of bamboos cultivated in the United States. Part II: The giant tropical clumping bamboos. J. Amer. Bamboo Soc. 2(1):1-20.
- Holttum, R.E. 1956. On the identification of the common Hedge Bamboo of South-east Asia. Kew Bull. 1956(2):207-211.
- McClure, F.A. 1966. The Bamboos - A Fresh Perspective. Harvard University Press. xv+347pp.
- Merrill, E.D. 1923. An Enumeration of Philippine Flowering Plants. 1:i-vii, 1-240.
- Merrill, E.D. 1935. A commentary on Loureiro's "Flora Cochinchinensis". Trans. Amer. Phil. Soc. New Series 24(2):1-445.
- Young, R.A. 1946. Bamboos in American Horticulture. IV. Nat'l. Hort. Mag. 25:257-283.
- Young, R.A., & J.R. Huan. 1961. Bamboos in the United States: Description, Cultivation, and Utilization. U.S.D.A. Agri. Handb. No. 193:1-289.

BOOK REVIEWS

George M. Hocking
School of Pharmacy, Auburn University
Auburn, Alabama
36849

(Reviews are in alphabetic order of authors, organizations, standard works, &c.)

"REVIEWS OF PHYSIOLOGY, BIOCHEMISTRY, AND PHARMACOLOGY", Vol. 88, edited by R. H. Adrian et al. V + 1-264, 29 figs. Springer-Verlag Berlin, Heidelberg, New York. 1981. DM,98,-- (ca US \$ 58.00).

This volume of the review series previously known under the title "Ergebnisse der Physiologie, biologischen Chemie und experimentellen Pharmakologie," carries four articles, one a biography and three papers dealing with the physiology and pharmacology of the nervous system. The biography of Walter R. Hess (1881-1973), for many years Professor and Director of the Physiological Institute of the University of Zurich, tells in considerable detail about his researches on the circulation and the nervous system, his work in psychophysiology as well as considerable about his personal life and personality. He is best known for his discovery of the functional organization of the interbrain (thalamencephalon, a part of the diencephalon) as coordinator of the activities of the central organs. Hess was a co-winner of the Nobel Prize in medicine and physiology, 1949. Supplementing the biography (in German) is a list of his most outstanding works. - Also in the volume is a paper on neural organization and control of the baroreceptor reflex in which sense organs (receptors) respond to changes in pressure, such as blood pressure. Another paper deals with "event-related" slow (DC) potentials in the human brain (M. Haider and others) referring to directly coupled stimuli and responses, a linking of sensory stimuli and motor acts. Finally, there is a presentation on α -adrenoceptor subclassification, with a discussion on adrenoceptors, or chemical sites in effectors, which receive nerve impulses and react by movement, secretion, etc., following uniting with the adrenergic mediator, and a proposed division of these receptors into two groups, designated α_1 and α_2 . The differences in the two are described at considerable length. - In the roster of editors, the address of one is given as Cambridge: since there are outstanding universities at both the English Cambridge and its American namesake, the address should have been more complete.

TWENTY-TWO COMMON HERBS AND HOW TO USE THEM," by Ruth N. and Charles F. Allen. Ed. 2. 1-66, 23 figs. Branden Press, Boston, Mass. 1974. \$2.00.

A simple handbook tells of the commonest herbs and of how both gardener and cook can use them. The authors operate the Wint er Brook Gardens, Medfield, Massachusetts. There are illustrations of each herb, also directions on growing and preparing table dishes.

GMH

SIMPOSIO INTERNAZIONALE SULLA MEDICINA INDIGENA E POPOLARE DELL'AMERICA LATINA," Published by the Istituto Italo Latino Americano (IILA). XXV + 1-641, 97 figs., 13 tabs. IILA, Roma, Italy. 1979. Price \$30.00 (US).

Papers presented at an International Symposium on Indigenous and Popular Medicine of Latin America, held in Rome, 12-16 Dec. 1977, are here published in full and in their original languages. Most are in Italian with a number in Spanish and two in English. About 220 persons took part in the program, representing most every country of Latin America (18 by count) with a majority of Italians. (The USA was not represented !)

There is a table of contents at the end of the volume but no index. This latter would have been very helpful and important since many of the papers are fully technical in such fields as phytochemistry and ethnography. Several papers bear lists of the native drug plants that are now in use. The papers are arranged under the six sessions that were held, as follows: History and tradition of indigenous and popular medicine; the medicaments of indigenous medicine; ethnoanthropologic aspects of indigenous and popular medicine; plants and active principles of popular indigenous medicine; hallucinogens, shamanism, melotherapy (therapeutic use of music), and psychic therapy; and other contributions of indigenous medicine to modern medicine. Many of the articles have a bibliography. The articles in English are concerned with traditional medicine in the health services, and chemical studies of Myristicaceae from Amazonia used medicinally. Many of the articles deal with the medicinal plants of an area in general; others study in detail a single plant genus or species. Thus, there are papers on *Derris mollis*, *Abrus precatorius*, *Lonchocarpus*, *Tephrosia*, *Euxylophora paraensis*, *Croton draconoides*, and on the other hand there are presentations on medicinal plants currently used in Venezuela, Honduras, and so on. Among the recommendations made at the conclusion of the meeting was one to create an international institution for research and documentation of the indigenous and popular medicines of Latin America to be located in a Spanish American country but with Italian collaboration.

GMH

"NEW DRUGS IN CANCER CHEMOTHERAPY," edited by S. K. Carter, Y. Sakurai, and H. Umezawa. - Recent Results in Cancer Therapy No. 76: XIV + 1-336, 133 figs., 170 tabs. Springer-Verlag Berlin, Heidelberg, New York. 1981. Cloth, DM. 98,-; approx. US \$46.70.

The papers contained in this volume represent together a review of the most recent research results of a Japanese-American cooperative cancer chemotherapy program. Also included in this volume is information on the current chemical status of the anticancer drugs developed in the course of this research program. These papers were delivered at the 5th Annual Program Review of the U.S.-Japan Joint Agreement on Cancer Research, held at San Francisco, California, in May, 1979. The chief emphasis is on representatives of the anthracyclines (such as Aclacinomycin (derived from *Streptomyces galilaeus*) and Carminomycin (derived from *Actinomadura carminata*), the bleomycins (from *Streptomyces verticillus*), the fluorinated pyrimidines, the nitrosoureas, and many other new drugs. Their uses in cancer and especially in solid tumors are reported. There are also chapters on various kinds of cancers, such as gastric, "oat cell" lung, head and neck, and breast cancers. One chapter is devoted to natural products, mostly antibiotics (especially from soil fungi), but there are also included a number of products from higher plants, such as baccharin (from *Baccharis* sp.), *Eriophyllum* sp., and taxa of *Cephalotaxus*, *Tripterygium*, *Taxus* (the very poisonous yew), *Phyllanthus*, and others. The 70 contributors including the three editors are listed with their affiliation or address. Besides American and Japanese scientists, several French specialists also participated in the program.

G M H

"THE WEALTH OF INDIA: A DICTIONARY OF INDIAN RAW MATERIALS AND INDUSTRIAL PRODUCTS. - RAW MATERIALS: Vol. XI: X - Z and cumulative indexes. xxvii + 1-385, 29 figs., 5 col. pls. Council of Scientific and Industrial Research, Hillside Road, New Delhi, India. 1976. \$42.00.

The text of this dictionary covers pages 1-126, the indexes occupying the remaining 259 pages, so that about 2/3 of the volume is taken up with the collective indexes covering all 11 volumes of the Raw Materials part of this great work. There are actually four indexes: (1) botanical names; (2) zoological names; (3) chemical compounds and active principles; and (4) common names (English, Indian (plant and animal), regional, trade). This volume completes the set of Raw Materials volumes which was begun ca 1945 and is based (supposedly) on the volumes of Watt's "Dictionary of the Economic Products of India" (1883). Here we have an encyclopedia (more than

simply a dictionary) of great utility, particularly to the economic botanist because of the large proportion of its pages devoted to plants. (See review - Quart. J. Crude Drug Res. 17: 91-2; 1979).

GMH

"THE GUINNESS BOOK OF PLANT FACTS AND FEATS", by William G. Duncalf. 204 pp., 50 figs., 40 col. pls. Guinness Superlatives, Ltd., 2 Cecil Court, London Road, Enfield, Middlesex, England. 1976. £5.95 (approx. US \$8.75).

Title interesting and attractive volume is a kind of combination of the Guinness Books of Records and the Book of Lists. In addition, there is a considerable amount of information about plants which might perhaps be adapted to a beginner's course in botany or natural history. There are chapters on plant classification, history of the study of botany, evolution of plants, relation of plants to man, trees, orchids, other flowering plants, seed viability, vegetables and fruits, poisonous plants, "riddles" of botany, dating of trees and tree remains, measurement units of older days, and a glossary. An appended chapter was written by a man famous for growing giant vegetables - Colin Bowcock. Most records shown (such as the sunflower growing 21+ feet high) relate to plants in England, but there are also records from the USA, New Zealand, and other countries. Thus, the reputedly tallest trees of the world, the coast redwood of California, (-362 ft.) are mentioned; nothing is said of the reputedly tallest eucalypts in Australasia (up to ca 550 ft.) reported by Bushmen but lacking in proof. The tallest foxglove reported (10'8") (p 116) may be exceeded by plants growing in Washington State (US) (fide H. W. Youngken, Sr.). Some record specimens of black locust are described but no mention is made of the famous tree in the Jardin des Plantes at Paris some 300 years old. The excellent color photos of Rafflesia and coc-de-mer on the dust cover unfortunately lack a known object in the view to indicate by contrast their enormous sizes. The color picture on the cover and the text black and white photo of Carnegiea gigantea are hardly typical plants. (The dust cover should be retained since it includes illustrations mostly not reproduced in the text). This book will be of interest to persons of all ages!

G M H

"BRADYKININ, KALLIDIN, AND KALLIKREIN," edited by E. G. Erdős. Handbook of Experimental Pharmacology, Vol. 25, Supplement XXII + 1-842, 83 figs., 81 tabs. Springer-Verlag Berlin, Heidelberg, New York. 1979. Cloth. DM. 360,--\$198.00.

This splendid volume furnishes a definitive treatment of the substances of the title. It represents the "cream of the

cream" of the scientific literature on these potent pharmacologic agents. The importance of the substances may be gauged by the fact that this is a supplement to the original volume covering the subject, vol. 25, which was published in 1970. (There are almost as many pages in the supplement as in the original treatment). The text is entirely in the English language. The editor, Dr. Ervin G. Erdős, is a professor at the University of Texas Medical School at Dallas and was the Editor of the original work of 1970. His 23 co-authors come from five countries - the most from the USA with 15 and Great Britain second with 4; other authors are from West Germany and Canada. These volumes which are complementary to the older volumes of Springer are reference works which should be available to every one working in the field of pharmacology or therapeutics. - The kinins are defined as those endogenous peptides (or protein fragments) which act on blood vessels, smooth muscles, and nerve endings. Thus, bradykinin is made up of a chain of nine amino acids liberated from globulin (from the blood plasma) by the action of the enzyme trypsin. Kallidin is a kind of kinin which is liberated by the action of kallikrein, an enzyme, on blood plasma globulin. Kallikrein occurs in various glands (the glandular kallikreins), also in urine and lymph, and is itself derived from Kallikreinogen, normally present in the blood: it may be released by various physical/chemical changes. Kallikrein and the kinins play an important role in the body's physiology, since they affect blood coagulation, the activation of complement (so important in immunologic processes), and in the generation of angiotensin (which is important in blood pressure control and in stimulating the secretion of aldosterone by the adrenal cortex). Kinins are also very significant inasmuch as they have a pivotal place in release or moderation of such essential agents as the prostaglandins, histamine, and the catecholamines. Although these various substances have been known albeit only slightly for over half a century, this tremendous efflorescence of interest and research activity are only of recent development. The significance of this work cannot be over-estimated.

GMH

"USE OF PLANTS FOR THE PAST 500 YEARS," by Charlotte Erichsen Brown. xxiv +1-512, 356 fig. Breezy Creeks Press, Box 104, Aurora, Ont., Canada L4G 3H1. 1980. \$14.95, US (paperback); \$24.00 US (cloth).

In this synoptic survey of ethnobotany, consideration is given only to plants of North America, a fact which should perhaps have appeared in the title. The authoress has endeavored to go to original sources undefiled by plagiarism or secondary treatments as so often occur in the literature. This usage

of the earliest writings is made prominent in the text by placing a date in a bold-face type at the beginning of each quotation. Many of these dates go back to the 1500's while others antedate Columbus' discovery, even at times going back to dates B. C. This chronology comes from efforts of paleobotanists and archeologists to furnish us with a picture of the plant life and plant usages going back to the earliest times. Wherever possible, direct quotations are given, sometimes as translations from the French or Latin. There are also brief descriptions of plants and their habitats. The plan of the book is to arrange the plants according to habit and ecology. Thus, the sections cover in order: the evergreen trees; deciduous trees; shrubs and vines; then plants found in wet open places (such as swamps, bogs, stream banks) those found in woods and thickets; and finally those in dry open places (fields, burnt-over land, &c.). There is an interesting Introduction, and at the end of the text a glossary (mostly of medical terms), an annotated listing of sources (arranged in alphabetic order of personal names, book titles, &c.), and finally the very useful indexes - one of general items and common plant names, another of scientific plant names. There are numerous line drawing illustrations, apparently from Britton and Brown's "Flora". This work should prove of much value to several classes of students - botanists, pharmacognosists, ethnobotanists, archeologists, historians, and others. No doubt persons planning on "living off the land" will appreciate having the book along to know what plants were used for foods, &c., by the aborigines. (An addendum sheet is present).

GMH

"THE SAFETY OF MEDICINES: EVALUATION AND PREDICTION," by Peter I. Folb. xii + 1-103, 4 figs., 6 tabs. Springer-Verlag Berlin, Heidelberg, New York. 1980. \$12.90.

In this work by an eminent South African physician, a series of six chapters presents the possibilities of predicting teratogenic, habituating, cancerogenic, and adverse reactions from the administration of various drug substances. A final chapter discusses the modes of monitoring drug safety in the clinical setting. The extrapolation of data from animal experiments to the relevant clinical situation is described. The objective of this study is to reduce as far as possible unnecessarily tedious, expensive, redundant, and wasteful experimentation in the evaluation of new medications. This is an attractive little book with flexible plastic cover

GMH

"RESUSCITATION AND LIFE SUPPORT IN DISASTERS: RELIEF OF PAIN AND SUFFERING IN DISASTER SITUATIONS " (Proc. International

Congress on Disaster Medicine, Mainz, BRD., 1977). Part II, with R. Frey and P. Safar (Editors). xix + 280 pp., 81 figs. 52 tabs., soft cover. Springer-Verlag Berlin, Heidelberg, New York. 1980. DM, 84,-- (approx. US \$ 50.00).

The text (100% English language) is made up of two series of papers, one covering critical care (resuscitation and life support) in disasters (such as earth-quakes) and the other the relief of pain and suffering in various disaster situations. These formal lectures are followed by workshops on (1) resuscitation (2) intravenous fluids (3) relief of pain and suffering (4) "free topics", i.e., subjects not pertinent to the previous categories. In the discussion on care in disasters, all angles are explored: organizational, medical, social, psychological, and ecological effects of such crises. The strong points and weaknesses manifested in current disaster preparation and practice are importantly demonstrated as well as the prevention, diagnosis, and treatment of the injuries of the individual patient. Unfortunately not all of the presentations at the Congress are included in the two volumes, this and the preceding one. Both natural disasters (as floods) and those proceeding from human activities (such as war) are included. Critical care medicine ("acute medicine") resuscitation, emergency care, intensive care -- all of these terms are applicable to the area of medicine covered. There are 121 authors listed and these are from 16 different countries, indicating a truly international concern. (Dr. Ransford from Victoria, B. C., is erroneously cited as from Great Britain instead of Canada). In view of the many natural and non-natural disasters occurring so often throughout the world, this work (part of a series "Disaster Medicine") should be of much interest to many groups and individuals.

GMH

"ATHEROSCLEROSIS V. PROCEEDINGS OF THE FIFTH INTERNATIONAL SYMPOSIUM ON ATHEROSCLEROSIS," edited by Antonio M. Gotto, Jr., Louis C. Smith, and Barbara Allen. XXXIX + 1-843, 250 figs., 183 tabs., cloth. Springer-Verlag Berlin, Heidelberg, New York. 1980. DM. 93,--; approx. US \$ 55.00.

Following a plenary session on cardiovascular surgery, six workshops were conducted on related subject matters, then a plenary session on dietary prevention of coronary heart disease, in turn followed by another six workshops. A third plenary session dealt with "The vessel wall in atherosclerosis" followed by a series of six workshops, then a plenary session on plasma lipids, lipoproteins, and atherosclerosis with a final six workshops. In all, some 360 contributors took part, either as chairpersons or speakers; most were from the USA, no doubt because the Symposium was held at the Baylor

College of Medicine in Houston, Texas. The contents of the large volume are available, both through the table of contents and the comprehensive index at the end. A complete list of contributors shows their status and address. At the conclusion of each presentation, literature references are given. Some topics receiving discussion included epidemiology of atherosclerotic lesions, drug treatment of hyperlipidemia; lipid, apoprotein, and lipoprotein origin and synthesis; lipoprotein structure; prevalence and inheritance of hyperlipidemia; risk factors in children (cigaret smoking by the young may induce atherosclerosis even at this age); enzymes of lipoprotein metabolism; non-dietary, non-pharmacologic treatment of hyperlipidemia; high density lipoproteins (HDL) as a negative risk factor in coronary heart disease; the nature of the arterial wall; vessel wall-platelet interaction; mutants affecting lipoproteins and apoproteins; hypertension as related to these problems; progression and regression of atherosclerosis; relationship between lipid and prostaglandin metabolism; cellular metabolism of lipoproteins; and other topics. There can be no question that the condition of atherosclerosis is a very complicated one, both in etiology and control. No complex medical problem is more important than this one !!

GMH

"TROPICA: COLOR CYCLOPEDIA OF EXOTIC PLANTS AND TREES FROM THE TROPICS AND SUBTROPICS," by Alfred Byrd Graf. Ed. 1: 1-1123, 7000 col. pls., figs. Roehrs Co., Publishers, East Rutherford, N. J. 07073 (USA). 1979. \$115.00.

This large heavy volume contains 896 pages of colored plates, mostly nine to the page (but sometimes as few as four), plates which accurately reflect the habit of the plant and could often be used for identification, nearly always at least for generic identification. There are several notable features aside from the valuable collection of illustrations: a relief map of the world on the front end sheets; a textual section descriptive of the tropics and subtropics, with some practical notes on cultivation; the growing of this class of plants indoors at various latitudes; and other subjects. At the back of the work there will be found a very handy compilation of plant descriptions, the plants being arranged by scientific name, with alphabetic sequence of the genera. This text briefly describes the plant, giving its origin, common names, and ecological requirements in a nutshell. A glossary of scientific terms used in describing plants is amplified by means of a page with many figures. One unique feature is a brief capsule of information on each plant family (in alphabetic order) including a sketch of a characteristic feature, be it the inflorescence, flower, leaf arrangement or shape, or whatever.

A bibliography of hundreds of references follows, and a reference list of common names (English language), and finally the index of genera, which cites pages of the section of illustrations but does not cite the genus in the plant description section. Sampling of this index showed a high degree of accuracy, which cannot be said of many indices. The colored plates are arranged in the alphabetic order of the genera but there may be some exceptions so that the initial use of the index is advised. This is a most valuable volume for both botanist and horticulturist and well worth the asking price, which in consideration of inflation is not as large as it once would have sounded. - A similar work with the same author and publisher is "EXOTICA", which is somewhat larger and more complete.

GMH

"CARDIAC GLYCOSIDES, Part 1: EXPERIMENTAL PHARMACOLOGY,"
edited by K. Greeff. - Handbook of Experimental Pharmacology, Vol. 56, Part 1. XXIV + 682 pp., 164 figs., 37 tabs.
Springer-Verlag Berlin, Heidelberg, New York. 1981.
Cloth, DM. 390,-- (approx. US \$ 166.)

This volume starts out in classic form with a brief history of the discovery and study of the cardiac glycosides (CG) from ca. 1600, B.C. up to A.D. 1933, at the same time giving a brief but helpful oversight on the contents of this volume. There follows a treatment of the chemistry and structure-activity (S/A) relationships of the CG steroids. A large section of chapters on methods of determining these substances includes: (1) chemical and chromatographic procedures; (2) the use of radioactively tagged glycosides; (3) radio immunologic methods (RIA) (using attached protein molecules (carriers) to furnish antigens which are then radio-labeled). This latter procedure is a very complex one involving the development of antibodies, combination of same with digoxin, and tagging with radioactive iodine, separation, and assay by Geiger counting. (4) Use of ATPase (adenosine triphosphate-ase) for determination of CG is discussed with detailed information on procedures. Finally, (5) a method of determination by uptake of radioactive rubidium (earlier K was used) by the red blood cells is detailed, in which absorption of the cation is inhibited by the presence of CG in the blood plasma, this the rubidium erythrocyte assay (REA). The following large section covers biological methods for assaying CG (1) in the intact animal (pharmacodynamics); (2) using isolated capillary muscle (from heart ventricle) to determine inotropic potency (force or energy of muscle contractions) of CG; and (3) in isolated heart preparations (entire heart; auricle (atrium); heart-lung preparation; cultured heart cells). The largest mass of text (302 pp.)

follows, covering the treatment of mode of action of CG, including positive inotropic effect of CG on ventricle; influence of CG on electrophysiological processes; influence on heart muscle energy metabolism; effect of CG in inhibiting membrane electrolyte transport by $\text{Na}^+\text{-K}^+$ -activated membrane ATPase; effect of CG on their receptors (specific binding sites); influence of CG on cell membranes, on electrolyte exchange and content in cardiac muscle cells, and on myofibrils (fine filaments within the muscle fiber cell). There is also a chapter on CG-like compounds with similar inotropic properties, such as cassaine from *Erythrophloeum* species. The last large segment of text is devoted to considering the non-cardiac effects of CG, including side effects on the central and autonomic nervous systems, vascular system, skeletal muscles, endocrine system, and kidneys. Rather interesting are observations that CG appear to act as estrogens; however, this is attributed not to a direct action but to inhibition of breakdown or excretion of estrogens from the body. - The present treatise is the third on CG to appear in the "Handbook of Experimental Pharmacology", the preceding ones being by W. Straub (HB II.2; 1924) and L. Lendle (HB I; 1935). These publications appeared at a time when the encyclopedia was titled "Heffter und Heubner: Handbuch der experimentellen Pharmakologie", named after Heffter who established the series (ca 1919) and Wolfgang Heubner (1877-1957), who continued it. The present volumes are written by a large group of specialists (32 in part I: all from Germany or German-speaking countries, except for 5 (USA, Australia, South Africa, Belgium), because it was felt that shorter contributions could be prepared more rapidly and would be more up to date and of course would have the advantage of being prepared by specialists active in a smaller area of the discipline. The disadvantage lies in a certain degree of overlap despite the best efforts of the editor. However, the net result would seem to be advantageous to the user of this superb Handbook.

GMH

"CARDIAC GLYCOSIDES. Part II. PHARMACOKINETICS AND CLINICAL PHARMACOLOGY," edited by K. Greeff. Handbook of Experimental Pharmacology, Vol. 56, Part II. XXI + 394 pp., 64 figs., 42 tabs. 980 g. Springer-Verlag Berlin, Heidelberg, New York. 1981. Cloth DM 248,-- (US \$ 115., approx.).

Although only about half the size of Part I and published first, this volume is of greater interest and utility to physician and pharmacist than the first part. The editor of both parts, Dr. K. Greeff (University of Dusseldorf, BRD) co-authored four chapters in Part I and one chapter in Part II, hence took a very active part in the preparation of the work. One other author (Dr. D. T. Mason of the Univ. of California) participated also in both parts (3 chapters). Part II occupies itself chiefly with pharmacokinetics (study of the action

of a drug, including its absorption, distribution, localization, biotransformation, excretion (over a period of time) (Chaps. 1-9; some 200 pages), with somewhat less pagination (some 130 pp.) devoted to clinical pharmacology of the cardiac glycosides (CG) and their preparations. (Some might consider the inversion of this order of presentation preferable but the two fields are so closely related that it really makes little difference). The order of topics is as follows: pharmacokinetics of digitoxin, digoxin, strophanthus glycosides and squill glycosides. The coverage then becomes generalized, with discussions of plasma protein binding of CG; the intestinal absorption and secretion of CG; cardiac uptake and binding of CG; bioavailability of CG; and pharmaceutical quality control standards for CG. Under the main heading of clinical pharmacology, there are chapters on the effects of CG on the failing heart (decline of contractility of ventricular muscle) and the non-failing heart; the effect of disease on the pharmacokinetics of CG (ex. failure of absorption of substance from the gastrointestinal tract makes a great difference on activity); "clinical indications and choice" of CG; clinical conditions influencing glycoside effects; side effects and intoxication (poisoning or pathologic state) induced by CG: symptoms and treatment; and interactions between CG and other substances in the body. While the text is fully technical, the exposition is generally speaking as clear and precise as could be wished for. In an age when increasing interest and attention are being given to the mechanisms of absorption, action, and excretion of drugs, this volume will surely find a wide readership in both the medical and pharmaceutical professions. The text was prepared by 22 authors including the editor and is of international origin as shown by the country of origin of the writers (11 FRD, 4 USA, 3 Sweden, 1 each from England, Scotland, Finland, and Norway). As usual, the book is printed in attractive fashion and bound neatly and strongly in cloth, with perfect reproduction of illustrations. Each chapter is a self-contained unit with its own bibliography. There are also terminal author and subject indices, one for each Part. The indices for Part II are not cumulative for Part I. This work can be recommended for professional school libraries as well as for the private libraries of practitioners.

GMH

"PHARMAZEUTISCHE BIOLOGIE," by R. Haensel. Vol. I: Allgemeiner Teil. XIII + 412 pp. 226 figs., 13 tabs., 495 g. DM. 34,--; approx. US \$20.00. - Vol. 2: Spezieller Teil. XV + 484 pp., 197 figs., 2 tabs., 560 g. DM. 56,--; approx. US \$21.30. - Springer-Verlag Berlin, Heidelberg, New York. 1980. DM. 70,--; approx. US \$ 41.30.

These volumes are "Basic Texts" for the subject used in German schools and are numbers 204 and 205 in the Heidelberger Taschenbuecher series. The general text is divided into two chief parts, the first in eight chapters concerned with the origin and biosynthesis of natural medicinal substances along various pathways of synthesis. There are chapters on substances formed from acetate or propionate units, from "active" isoprene (isoprenoids), by the shikimate pathway (phenylpropanes), from tryptophan, from the alphatic amino acids ornithine, lysine, and glycine, and from a single amino acid. The second half of the text except for one chapter on comparative phytochemistry (chemotaxonomy) presents in eight chapters the general aspects of the preparation of natural or biogenic drugs, and the manufacture of medicinals from microorganisms, higher plants, and animal drugs, as well as the preparation of immunological-acting medicinals. - The second volume, the special part, takes up the individual drugs which are found in the German and the European Pharmacopeias (DAB.; *Europäisches Arzneibuch*; 1978), and discusses their preparation, constituents, purity and identity tests, etc. A considerable amount of space is devoted to the section on hormones, vitamins (but no vitamin B₆!), and antibiotics. An entire chapter is devoted to biogenic substances influencing blood coagulability. Important chapters concern products from the blood, also immune products, including immune sera, vaccines, and test sera (blood groups, etc.). Bases and adjuvants important for pharmaceutical manufacturing are given place: carbohydrates, fats, waxes, resins, aromatics, and taste correctives. Data are included on the origins of bandaging and suturing materials. The final chapter covers important pesticides. In both volumes, most of the figures are of chemical structural formulas. (Rudolf Haensel is Professor at the Free University, Berlin).

GMH

"THE NEW PENGUIN WORLD ATLAS," edited by Peter Hall. Ed. 2. VIII + 96 pp., 72 maps. Penguin Books, Inc., 625 Madison Ave., New York, N.Y. 10022. 1979. \$9.95 (USA).

Sharp well-labeled physical-political-economic maps combined with a 24-page gazeteer furnish the user with an important means of rapidly finding the locations of all the more important places on the globe. Special features are a list of states (i.e. nations) and dependencies throughout the world (plus statistics) and a listing of the major urban areas with their population statistics. In this edition, there has been relatively more emphasis placed on Africa and the Far East, which of course is realistic when one considers the important political changes taking place in these parts of the world. This is a veritable treasure contained in a small package!

GMH

"PSYCHOTROPIC AGENTS. PART I. Antipsychotics and antidepressants." Handbook of Experimental Pharmacology, Vol. 55/1: XXIV + 734 pp., 82 figs., 74 tabs., 1595 g. Edited by F. Hoffmeister and G. Stille. 1980. DM. 290.-- (approx. US \$ 171.00) (cloth bound). Springer-Verlag Berlin, New York.

This formidable work employed the special talents of 47 contributors (authors) together with the two editors, Hoffmeister from Wuppertal and Stille of Berlin. The text represents a rather detailed overview and study in depth of present knowledge in the action and use of the antipsychotics (such as the tricyclics and butyrophenones) and the antidepressants (such as the MAO inhibitors and lithium salts). A considerable amount of space is devoted to the definitive treatment of the groups from the standpoint of human usage. Space is devoted to the subjects of pharmacology, experimental psychology, clinical biochemistry, and neurophysiology as these pertain to the medical problem. However much emphasis is also placed on preclinical research, screening methods, neurochemistry, transmitter reactions, kinetics, toxicology, ethology, and electrophysiology. (The individual outlooks of the authors sometimes appear in the text.) There are 26 chapters in the volume, of which 15 are placed under the heading of the Antipsychotics (chemistry, structure, and effectiveness) and 11 under that of the Antidepressants (chemistry, structure, and effectiveness). The importance of clinical studies in this field of medicine results from the inadequacy of animal trials, since only the human psyche can positively identify mental reactions. Hence, although this is one of the volumes titled "experimental pharmacology", the text really represents a wide divergence from that field and thereby loses some of its objectivity, since proper controls are often lacking. This is truly an area in which psychiatrists and psychologists rather than physiologists and pharmacologists must be depended on for significant findings. Thus, it seems that such important agents as chlorpromazine, the monoamine oxidase inhibitors, and imipramine were discovered as psychotropics not by pharmacologists but by scientists in the field of mental health. Animal experimentation with development of models followed, but here pitfalls have developed and mistaken results developed. - Each chapter of this excellent work has its own bibliography but there is an index of authors at the end of the volume which cites both mention in the text and reference. As usual, the volume is a masterpiece of the printing and binding arts.

GMH

"A WORLD LIKE OUR OWN: MAN AND NATURE IN MADAGASCAR." by Alison Jolly. xvi + 272 pp., 184 pls., 6 col. pls., 1 map. Yale University Press, New Haven, Conn. 1980. \$29.95

The island continent of Madagascar (Malagasy) is truly a won-

derland of plants and animals; separated for so long from the African mainland, it has become endowed with many biological species of its own. In this work, Dr. Jolly, an expert on the lemurs tells about many of the 40 species still extant. However, she does not confine her interests to these primates but furnishes abundant information and illustrations of many more animals and plants. Of the latter, she speaks of Didierea alluaudia, a cactus-like plant which grows in desert areas, sometimes to a height of thirty feet. Not only are the plant and animal kingdoms of Madagascar explored and expounded here but there is a considerable treatment also of the human natives of the sub-continental land. The deplorable economic conditions in the area is the primary cause of the environmental destruction observed here, since the native peoples in order to exist are destroying the magnificent forests and with these the fertility of the land besides the destruction of the many plant and animal varieties. Unless something can be done for the welfare of the indigenous peoples, it would seem that the plant and animal resources are to a large extent doomed. Tragically, the beautiful and unusual organisms of many species will inevitably be wiped out. While such decay of the environment seems to be taking place almost everywhere today, it is greatly accelerated in this genuine Garden of Eden. We will all suffer and our descendants when this enormous resource and treasure is gone! - The book brings out the great variety of living conditions which prevail here: rain forests in the eastern parts, spiny deserts in the interior, dry woodlands, vast plateaux. Madagascar is a microcosm of what is occurring in many other part of the world, due essentially to overpopulation and the consequent struggle for the available resources. Family size reduction would seem to be the only effective answer to the rapidly growing international crisis of starvation, desperate poverty, and homelessness of the great masses of people seen most acutely in Africa and Asia. Let us hope that this book will provide a warning that will be heeded by the world's leaders !

GMH

"BOEKER'S GRAESERBESTIMMUNGSSCHLUESSEL. Bestimmen in bluehend und bluetenlosen Zustand. Verbreit und Wert," revised by Ernst Klapp. 1-57, 101 figs. Verlag Paul Parey, Berlin. 1978. DM. 12,80. (c \$ 7.00). (Ed. 2).

This elaborate determination key covers 48 species of Gramineae. The key is preceded by explanations for using it, including definitions and illustrations of many special terms. The grass species included are those found most commonly in Germany and central Europe generally.

GMH

"EXTINCTION IS FOREVER: THREATENED AND ENDANGERED SPECIES OF PLANTS IN THE AMERICAS AND THEIR SIGNIFICANCE IN ECOSYSTEMS TODAY AND IN THE FUTURE," edited by Ghilleen T. Prance and T. S. Elias. VI + 1-437, 106 figs. and 25 tabs. The New York Botanical Garden, Bronx Park, New York 10458. 1977. \$22.00. (Paper back)

The title of this book is tragically but most truly expressive. When a plant or animal species disappears for whatever reason, we are all left the poorer - left lacking a vital element which might eventually have developed into or contributed to an organism of great utility or beauty in the world of life. (Besides that there is the intrinsic worth and right to existence of the organism as it is). That this destruction or extinction is not a rare occurrence is shown in the statement of the Smithsonian Institution authorities that some 5% of the plants in the United States are being threatened or endangered. This volume explores some of the ways in which endangerment and threats against the existence of wild plants are manifested in various countries of the world, and some of the possible means of conservation which may limit or oppose this destructive process. The 40 papers presented at a Symposium held at the N. Y. Botanical Garden 11-13 May, 1976, to commemorate the U. S. Bicentennial include a first section treating of the problem in general terms in various parts of the USA and Canada. Section 2 deals with the threatened and endangered plants of Mexico, Central America, and the Caribbean Islands. Section 3 considers South America, while Section 4 takes up various groups of plants which are especially prone to endangerment in the Americas: Iridaceae, palms, "Cacti", orchids, carnivorous plants, ferns. Section 5 - "Special Topics"-considers a diversity of matters such as the use of computers in solving problems of extinction, cooperation between various countries in conservative efforts, etc. Panel discussions are recorded on a pot pourri of topics by many participants. Resolutions, a list of contributors (those presenting papers), and a list of participants and 4 appendices complete the volume. There is no index! Appendix 1 is a bibliography for the endangered species of the world; App. 2 gives the Pan American treaty of 1940-1 between the USA and other American republics concerning conservation of wild life; App. 3 is the Convention of 1975 on international trade in endangered plant and animal species, which includes appended lists of animal/plant species; and App. 4 is an extract from the US Congressional Act of 1973 intended to provide for conservation of fish, wildlife, and plants. It is interesting to note some of the organisms now threatened, such as *Cattleya* orchids, the polar bear, tiger, ginseng, and *Guaiacum sanctum* (source of guaiac wood). (The colored cover photo represents the species *Lapageria rosea* (Philesiaceae) which was not found in any of the lists but was used apparently because it is the sole

species in its genus, and has flowers of great beauty and edible fruit.

GMH

"MEDICAL ABBREVIATIONS AND ACRONYMS," compiled by Peter Roody Robert E. Forman, and Howard B. Schweitzer. vii + 255 pp. McGraw-Hill Book Co., New York, San Francisco. (Blakiston) 1977. \$7.50.

This compilation reflects usage in the medical field for English language users, apparently with greatest application to the United States area. More than 14,000 terms have been listed in alphabetic sequence, often with a single abbreviation or acronym applying to several words or expressions. Thus, for instance, PI is referred to no less than twelve compellations such as "pneumatosis intestinalis," Protocol Internationale (International Pharmacopeia), etc. Some terms which might well have been included but were not are the following: AUC (blood concentration (time) curve); MDC (medical officer in charge); UDCA (ursodeoxycholic acid); PDA (potato-dextrose-agar (medium)); LTCF (long term care facilities); ABOB (moroxydine); OLT (official Latin title); OET (official English title); HLTH (health); FP (fetoprotein); LIF (leukocyte inhibitory factor); PSMRD (post surgical minimal residual disease); PCS (Pharmacy Care Systems); TPP (triphenyl phosphate); CWP (childbirth without pain); CMT (cancer multi-stage therapy); GS (general schedule); TAT (till all is taken i.e., medicine); WAW (while awake). On the whole, the coverage in this dictionary is very good - much better than seen in the usual medical dictionary.

GMH

"FRUITS OF ANGIOSPERMS," by Ingrid Roth, Ph.D. xvi + 675 pp 232 figs. Handbuch der Pflanzenanatomie (Encyclopedia of plant anatomy). Special Part. Vol. 10, Part I. Gebrueder Borntraeger, Berlin, Stuttgart. 1977. DM. 288,-- (\$144.)

This splendid volume, standard with the remainder of the series, is a most useful monograph on the physical characteristics of the fruit of the Angiospermae, dealing chiefly with the anatomy of these structures but also with a considerable amount of information on the gross morphology. There are also interesting chapters concerning fruit abscission; special structures concerned with dispersion; and heterodiaspory (a state in which both aerial and subterranean fruits are produced by a plant) in its many variations. There are important terminal chapters on the taxonomic use of the pericarp structure, the phylogeny of the fruit, and the fruits of cultivated plants as related to polyploidy. This explores the relationship of doubling chromosome numbers to increases in fruit size so often noted during cultivation. An extensive bibliography and three indices complete the volume. More

than half of this book is devoted to a consideration of the differences prevailing among fruit structures, that is with the types of fruits found in the plant kingdom. Thus, there are large sections dealing with the caryopsis, achene, stone fruits, and so on. - The index does not seem as complete as it might have been for maximum utility. Thus, although discussed in the body of the text, there are no entries for such terms as berry, nut, grain, drupe, stone fruit, strobile (strobilus), multiple fruits (noted in table of contents), sorosis, hip (Rosa), key fruit (samara is given), capsule, pod, nutlet, anthodium, drupelet, etaerio, etc. Some variations and their corresponding terms seem not to have been taken up in the text, for instance, cochlea, arthrocarp, glans. There are also variant spellings which would invalidate the use of the index, thus, akene as a form of achene, sycon(us) for syconium, and so on. To facilitate the use of the book as well as of the index, a glossary might well have been added to the work. Appropriate cross referring would show the identity of many variants of spelling. It would also be useful for defining other terms which appear in textual descriptions of fruits, such as receptacle, carnose, succulent, dehiscent, and so on. Some of the terms which would qualify for such a listing of definitions are (additionally): pseudocarp, exocarp, epicarp, mesocarp, ventral and dorsal sutures, valve, valvate, apocarpous, syncarpous, and the following applying to dehiscence: loculicidal, valvular, septicidal, transverse, apical, porous, septifragal, rupturing. - Professor Roth of the Central University of Venezuela (Caracas) is to be congratulated on a work of such sterling worth as this, as well as on her previous volume in the series on barks
GMH

"ZUR PROBLEM DER ASPIRATION BEI DER NARKOSE: INTRALUMINALES DRUCKVERHALTEN IN OESOPHAGUS-MAGEN-BEREICH," by Gholam Sehat-Chafai. Anaesthesiology and Intensive Care Medicine No. 115: X + 100 pp., 27 figs., 55 tabs. Springer-Verlag Berlin, Heidelberg, New York. 1979. DM. 34,-- (U.S.\$18.70)

Regurgitation of the stomach's contents and the frequently following inhalation of the same ("aspiration") by the patient has caused many deaths during anesthesia from as far back as 1848. Studies show that 12-24% of all deaths during anesthesia are a result of such aspiration of gastric ejecta, especially in patients with a full stomach, a condition frequently encountered in emergency situations. The chief protection is in control of the lower esophageal sphincter muscle (LES) and this band-like muscle is here considered in detail. The effect of various drugs on it was studied as such might determine the resting pressure of the LES muscle. The group A drugs (pre-medication agents (or premedicants) including atropine sulfate and six other drugs) were tested on human subjects. Some of

these reduced the resting pressure of LES, but others increased it and this would be particularly dangerous in intensive care and emergency ward patients who often must be anesthetized and who have a full stomach. The Group B studied were the anesthetics (6 including nitrous oxide-oxygen), and these decreased the LES pressure and were therefore relatively safe from the process under study. - While this book is in German, there is a $1\frac{1}{2}$ page of English summary (however with some six errors). - A proper study and understanding of the subject matter in this volume would undoubtedly save many lives !

GMH

"KREMERS AND URDANG'S HISTORY OF PHARMACY," by Glenn Sonnedecker. Ed. 4. xv + 571 pp., 135 figs. (7-3/8" X 9 1/4").
J. B. Lippincott Co., Philadelphia, Pa. 19105. 1976. \$24.00

Although this is the fourth edition, and much of it written or rewritten by Dr. Sonnedecker, names of the original authors Edward Kremers and George Urdang, have been retained in the full title. The volume shows evidence of a rather thorough revision with much additional material. The four main parts (Pharmacy's early antecedents; Rise of professional pharmacy in European countries; Pharmacy in the USA; Discoveries and other contributions to society by pharmacists) have been subdivided into 18 chapters, the same number as in the previous edition. Among the changes noted, much material in the text proper has been systematized and placed in one of the seven appendices (representative drugs of the Amerindians; founding of state pharmaceutical associations; passage of state pharmacy laws; schools of pharmacy in USA; growing awareness of pharmacy history; pharmaceutical literature with bibliographic history notes; glossary). Thus, App. I was shifted entirely from earlier pages in the text; App. 5 includes sections on the pharmaceutical literature gathered from various earlier chapters dealing with pharmacy in Italy, France, Germany, and Britain. (Why was the chapter on Spain dropped from ed. 2 ?), The chronologies which were such a useful feature of ed. 1 and 2 were dropped from the last two editions. As in previous editions, nothing is said regarding oriental pharmacy (China, Japan, India, etc.). There are only 11 pages on Greece and Rome, which might indicate an underemphasis. The latter part of Chapter 3 telling of later trends in pharmacy may have been better taken up further back in the book, such as at the end of Part 2. The index could have been more complete. Nothing seems to have been said about the infamous Dreckapotheke (fecal pharmacy) in which the use of body excretions was practiced in Europe during the 16th and 17th Centuries. - It is generally held that Bologna is the oldest university in the world (dating from AD 1113) but the text indicates Parma and Salerno and possibly Paris as older. - Very little is said about the Doctrine of Signatures which played such an important role throughout history. The only mention of it is in one paragraph in the section on Paracelsus' concepts. - There is no ref

erence to the Codex Medicamentarius seu Pharmacopoea Gallica as the first national pharmacopeia. - The revival of the Deutsche Pharmazeutische Gesellschaft in 1945 (BRD) would seem to have deserved mention (p. 97). - Filix would better be referred to as Aspidium, reflecting U. S. Pharmacopoeial usage. Epsom salts is mentioned as the first medicinal patent. Some have claimed Goddard's Drops (prepared from human bones) for this honor. - Within the attractive hard cover (and the interesting dust cover) lies a fascinating and basically accurate story of the development of pharmacy in the western world, a story which should fascinate and thrill the modern pharmacist, wherever he may be !

GMH

"METHODOLOGY FOR ANALYTICAL TOXICOLOGY," edited by Irving Sunshine, Ph.D. 496 pp., 7 X 10". CRC Press, Inc., Cleveland, Ohio. 1975.

This "typically CRC bound" volume is an updated version of the 1971 CRC MANUAL OF ANALYTICAL TOXICOLOGY and presents acceptable methods for the analysis of therapeutic agents in biological fluids. - A short introduction offers general information regarding the chemist-physician relationship, sample taking and analysis, and interpretation of positive and negative results. - The "meat" of the book is a list of procedures in Section I for analysis of 101 different substances. A typical procedure will include: Principles of analysis, apparatus, reagents, procedure, calculation, interpretation, accuracy and precision, interfering substances, and references. Alternate procedures are listed for most substances in order to accommodate laboratories with differing resources. For example, barbiturates may be analyzed by a qualitative color test, a quantitative ultraviolet spectrophotometric test, or a quantitative gas chromatographic test. - Section II, Screening Procedures, is a "catch-all" for additional procedures (such as detection of the heavy metals mercury, antimony, bismuth, arsenic), tables (e.g., a table of tertiary amines that react with iodoplatinate reagent) and background information on the application of specific procedures involving UV spectrophotometry, TLC, GC, RIA, and the EMIT system. A "Phase Selectivity Data" table for GC (p 429) in Sect. II is too specific for the scope of this book whereas "Pointers on Gas Chromatography" (p 425) is too general. - This book's use is limited by its very construction - a list of methods for specific compounds. There are fewer general procedures for classes of compounds than for specific agents. The fact however that many drugs are covered makes this volume a welcome addition to any medicinal laboratory. The straightforward, thoroughly detailed (60 figures and over 30 tables) and referenced (over 700 cited) procedures can be used to determine the presence or absence of many drugs commonly involved in poisonings and illnesses.

Prof. C. R. Clark, Ph.D.
Auburn Univ., Auburn, AL 36830

"BEGONIAS: THE COMPLETE REFERENCE GUIDE," by Mildred L. Thompson and Edward J. Thompson. XII + 356 pp., 594 figs., 33 pp of col. pls., many tabs. N. Y. Times Books, 3 Park Ave., New York 10016. 1981. \$37.50.

In this splendid richly illustrated volume, you will find all of the information you will need to produce a garden or house full of the beautiful flowering plants called begonias. This large volume spells out all of the many details required for success in the propagation and culture of these valuable plants. After a brief introduction telling much about the development of our knowledge of this group of ornamentals, general information about the cultivation of the begonias as a group is furnished, then specific information for each of the recognized horticultural groups: cane-like (with erect or semi-erect stems reminiscent of bamboo stems); shrub-like (with smooth, hairy, or distinctive leaves); thick-stemmed (with relatively very heavy stems and little branching); semperflorens (blooming almost continuously throughout the year); rhizomatous (having prominent rhizomes which are horizontal, vertical, or evident at ground level); Rex Cultorum ("king of the gardens") (marked for their prominent foliage ornamentation); tuberous (with tuber-like formations or excessive growth of the rhizome at ground level or just above); and trailing-scandent (begonias which either trail or climb or both). The next section of text deals with "other ways of growing" that is, other than in the conventional flower pot: these include growing in hanging containers, in contained atmosphere (i.e., in terraria) and "naturalistic" (growing on driftwood, rocks, etc.). Sect. V concerns the growing environment or setting (window ledges; outdoors; greenhouses). The last section is concerned with hybridization. Finally a glossary and 3 appendices: a long reference list of begonias, with 2450 (!!) species and cultivars; a list of 25 begonia dealers; a very useful bibliography; and a detailed index.

GMH

"COCA AND OTHER NATURAL DRUGS," by Andrew Weil. Cassette No. 3615. 1 hour. Big Sur Recordings, PO Box 91, Big Sur, Cal. 93920. 1978.

This is a lecture recorded on tape which tells much about the uses and properties of coca leaf as it is employed among the Indians of northern South America. In addition to leaf chewing, the Amazon natives swallow a mixture of coca leaf with the carbonized leaf of some tree as stimulant for physical labor. Also recorded is the question period following the talk, in which the discussion also involves the values of Digitalis, Opium, etc., and the superior qualities of these over the so-called active principles of each.

GMH

174
1,52
5

PHYTOLOGIA

An international journal to expedite botanical and phytoecological publication

Vol. 52

February 1983

No. 5

FIFTIETH JUBILEE YEAR

MAR 11 1983

CONTENTS

NEW YORK

BOTANICAL GARDEN

- FOOTE, M. A., *The algae of New Jersey (U.S.A.) IV. Phaeophyta (Brown Algae)* 281
- PRINGLE, J. S., *Nomenclature of the Amur Lilac, Syringa reticulata var. amurensis (Oleaceae)* 285
- CREWZ, D. W., & MOFFLER, M. D., *A white-flowered Erythrina herbacea L. (Fabaceae) from the Gulf coast of Florida* 288
- MOLDENKE, H. N., *Additional notes on the genus Aegiphila. XXXI.* 289
- MOLDENKE, H. N., *Additional notes on the genus Bouchea. VII* 309
- MOLDENKE, H. N., *Additional notes on the genus Casselia. V* 320
- MOLDENKE, H. N., *Additional notes on the genus Chascanum. IX* 323
- MOLDENKE, H. N., *Notes on new and noteworthy plants. CLXIII* 330
- HENRY, R. D., & SCOTT, A. R., *New state records and other noteworthy collections for the Illinois vascular flora* 331
- HENRY, R. D., *Aspects of the weed component of the spontaneous Illinois vascular plant flora* 336
- SILBA, J., *Addendum to a revision of Cupressus L. (Cupressaceae)* 349
- GANDHI, K. N., & THOMAS, R. D., *A note on the gynoeceum of Crataegus and of Punica (Punicaceae)* 362
- GANDHI, K. N., & THOMAS, R. D., *A note on the odd petal in angiosperms* 365
- BURNS-BALOGH, P., *Nomenclatural notes in Spiranthiniae (Orchidaceae)* 367

Published by Harold N. Moldenke and Alma L. Moldenke

303 Parkside Road
Plainfield, New Jersey 07060
U.S.A.

Price of this number \$3.00; for this volume \$13.00 in advance or \$14.00 after close of the volume; \$5.00 extra to all foreign addresses and domestic dealers; 512 pages constitute a complete volume; claims for numbers lost in the mails must be made immediately after receipt of the next following number for free replacement; back volume prices apply if payment is received after a volume is closed.

The Algae of New Jersey (U.S.A.)
IV. Phaeophyta (Brown Algae)

MaryAnn Foote
Ecology Program
Rutgers University
New Brunswick, New Jersey 08903

Brown algae are primarily marine organisms of cold water. Some species of brown algae occur in brackish waters and salt marshes. Three genera are found in freshwater; however, the freshwater genera are rare and most brown algae are attached forms in the relatively shallow waters of the intertidal and subtidal zone.

Again, the genera are listed alphabetically and collection dates chronologically within them.

I gratefully acknowledge the assistance of Ellen J. Vastola who prepared this document on the DEC-20 at Rutgers University.

PHAEOPHYTA

BROWN ALGAE

Ascophyllum nodosum (L.) LeJolis
Atlantic City, common (5); common, washed up in abundance at Longport, rare at Sandy Hook, Cape May (2); Cape May Point and Great Sound, Oct and Jul (6); Great Bay, May (4)
Ascophyllum nodosum f. scorpioides (Hornemann) Reinke
Barnegat Bay, Jul, Oct and Dec (9);
Manahawken salt marsh (8)
Asperococcus echinatus (Mert.) Grey
Raritan Bay, Mar (1); Great Bay, May-June (4);
Barnegat Bay, Jan-May (9)
Chordaria flagelliformis (Mull.) C.Ag.
rare at Atlantic City (5)
Desmarestia viridis (Mull.) Lamour
Barnegat Bay, Feb-Mar and May (9)
Desmotrichum undulatum (J. Ag.) Reinke
Great Bay, Jan (4); Barnegat Bay,
Jan-June, Nov-Dec (9); Barnegat Bay (8)
Desmotrichum undulatum var. zosteræ LeJolis
common at Atlantic City (5)
Dictyosiphon foeniculaceus (Huds.) Grev.
rather common at Atlantic City (5)
Dictyosiphon foeniculatus var. americanus Collins
Cape May harbor, May (6)
Ectocarpus confervoides (Roth) LeJolis
very common at Atlantic City (5); along coast in cold weather (6); Raritan Bay, Nov-Mar (1); Great Bay, May, June and Nov (4); Barnegat Bay, Feb, May-June, Dec (9);
Manahawkin marsh (8)

- Ectocarpus siliculosus (Dillw.) Lyngb.
common at Atlantic City (5); inlets, May-Oct (6);
Raritan Bay, Dec and Mar (1); Great Bay, Mar, May,
Nov (4); Barnegat Bay, Feb-Mar, May-June, Dec (9);
Forked River, Apr-Aug, Oct, Dec-Jan, Stouts Creek (3)
Ectocarpus siliculosus f. hiemalis (Crovan) Kuckuck
Barnegat Bay, Dec-June (9)
Ectocarpus tomentosus (Huds.) Lyngb.
rather common at Atlantic City (5); Great Bay,
Jan (4); Barnegat Bay, Dec-Jan (9)
Elachista fucicola (Vell.) Aresch.
common on Fucus, Atlantic City (5); coast, late summer
to fall (6); Great Bay, Jan, Aug-Oct (4); Barnegat Bay,
Feb-Mar, May-June (9)
Fucus edentatus De la Pyl.
Atlantic City, (5,2); Raritan Bay, Aug, Oct-Dec (1)
Fucus spiralis L.
Raritan Bay, Aug and Nov (1)
Fucus vesiculosus L.
common at Atlantic City (5); common along whole coast (2)
common all year along coast (6); Raritan Bay, Jul-Aug,
Oct-Dec, Mar (1); Great Bay, all year (4); Raritan Bay,
June and Oct (7); Manahawkin salt marsh, Barnegat
Bay and Little Egg Harbor (8)
Fucus vesiculosus var. laterifructus Grev.
common along whole coast (2)
Fucus vesiculosus var. spiralis Farlow
common along whole coast (2)
Giffordia granulosa (J.E. Smith) Hamel
not uncommon (5); Barnegat Bay, Jan-Feb, June, Dec (9)
Giffordia mitchellae (Harv.) Hamel
Great Bay, June (4); Barnegat Bay, June (9)
Halothrix lumbricalis (Kutz) Reinke
Barnegat Bay, Jan-Aug, Oct (9)
Hecatonema terminalis (Kutz.) Kylin
on Zostera, Atlantic City (5)
Laminaria agardhii Kjellm.
Cape May, Atlantic Highlands, Beach Haven, Barnegat
Bay and Forked River, all year (6)
Laminaria saccharina (L.) Lamour
not rare, but not so common nor luxuriant as further
north; washed ashore from below the low water mark (5)
Leathesia difformis (L.) Aersch.
not very common, generally of small size, growing on
Zostera at Atlantic City (5); Raritan Bay, Oct,
Nov, Mar (1); Great Bay, May (4); Barnegat Bay, May-June
(9); Little Egg Harbor (8)
Myrionema strangulans Grev.
Barnegat Bay, May-Aug, Dec and Mar (9)
Myriotrichia clavaeformis Harv.
Atlantic City (5); Great Bay, Mar (4);
Barnegat Bay, Jun-Jul and Dec (9)
Myriotrichia filiformis Harv.

- on Scytosiphon and Phyllitis (5);
Barnegat Bay, Mar, May, June and Dec (9)
Petalonia fascia (Mull.) Kuntze
Raritan Bay, Nov-Dec and Mar (1); Great Bay,
May, Nov-Jan, Mar (4); Barnegat Bay, May (9)
Punctaria latifolia Grev.
common at Atlantic City (5); harbor, common spring
to early summer (6); Raritan Bay, Mar (1); Great
Bay, Dec-May (4); Barnegat Bay, Dec-June (9)
Punctaria latifolia f. crispata (Kutz) Collins
Barnegat Bay, Dec (9)
Punctaria plantaginea (Roth) Grev.
rather common at Atlantic City (5); Cape May and
Beach Haven, Jan-Feb. (6); Great Bay, June (4);
Barnegat Bay, Dec-Jan and Apr-Jul (9)
Pylaiella littoralis (L.) Kjellm.
very common and variable, Atlantic City (5); common
along coast late spring and summer (6); Raritan Bay,
Mar (1); Great Bay, May-June (4); Barnegat Bay, Jan-Mar,
May-June (9)
Ralfsia clavata (Carm.) Crouan sensu Farlow
woodwork at Atlantic City (5);
Barnegat Bay, Jan, May-Jul and Oct (9)
Ralfsia verrucosa (Aresch.) L. Ag.
small form growing on woodwork at Atlantic City (5);
Barnegat Bay, June, Jul, Oct and Dec (9)
Sargassum filipendula C. Ag.
not very common at Atlantic City (5); frequently washed
ashore along entire coast (2); coast in Sept (6)
Sargassum filipendula var. montagnei (Bail.) Grun.
along entire coast (2)
Sargassum natans (L.) J. Meyer
frequently washed ashore at Atlantic City, Longport (2)
Scytosiphonia lomentaria (Lyngb.) Link
Beach Haven, Feb and Apr (6); Great Bay, Feb-Mar,
May-June (4); Barnegat Bay, Dec, Feb-Mar (9)
Sphacelaria cirrosa (Roth) C. Ag.
Barnegat Bay, Apr-Aug, Dec-Jan (9); Barnegat Bay (8)
Sphacelaria radicans (Dillw.) C. Ag.
Forked River, Jan, June-Aug; Stouts Creek, Jul, Oct (3)
Sphaerotrichia divaricata (C.Ag.) Kylin
not uncommon, at Atlantic City (5)
Stilophora rhizodes (Erhardt) J. Ag.
Barnegat Bay, Mar-Aug and Jan (9)

References

1. Abbiate, L.M. 1961. An ecological study of the attached marine algae of Raritan Bay. M.S. thesis. Rutgers University, New Brunswick, N.J. 69pp.
2. Britton, W.L. 1889. Catalogue of plants found in New Jersey. Final Report of State Geologist, Vol. II. 642pp.
3. Evans, C.A. 1977. The possible effects of thermal pollution on benthic algae in Oyster Creek, Barnegat Bay, New Jersey. M.S. thesis. Rutgers University, New Brunswick, N.J. 40pp.
4. Muller, H.W. 1965. The attached algae of Great Bay and Mullica River, New Jersey. M.S. thesis. Rutgers University, New Brunswick, N.J. 63pp.
5. Morse, S.R. 1888. Algae from Atlantic City. Bull Torrey Bot. Club 15: 309-314
6. Richards, H.G. 1931. Notes on the marine algae of New Jersey. Botanica 13: 38-46
7. Seeliger, U. 1976. Heavy metal concentration in water and algae in the Raritan Bay, N.J. M.S. thesis. Rutgers University, New Brunswick, N.J. 104pp.
8. Sugihara, T. and C. Yearsley, J.B. Durand and N.P. Psuty. 1979. Comparison of Natural and Altered Estuarine Systems: Analysis. Center for Coastal and Environmental Studies. Rutgers University, New Brunswick, New Jersey. 247pp.
9. Taylor, J.E. 1970. The ecology and seasonal periodicity of benthic marine algae from Barnegat Bay, N.J. Ph.D. thesis. Rutgers University, New Brunswick, N.J. 109pp.

NOMENCLATURE OF THE AMUR LILAC,
SYRINGA RETICULATA VAR. *AMURENSIS* (OLEACEAE)

James S. Pringle
Royal Botanical Gardens, Box 399, Hamilton, Ontario, Canada L8N 3H8

The natural range of *Syringa reticulata* (Blume) Hara includes portions of the islands of Japan and the mainland of Asia in Korea, China, and the Soviet Union. In both floristic and horticultural works, the Japanese and mainland populations are usually considered to be varietally distinct. The differences are so subtle that in only a few publications, most of them not recent, are these taxa treated as distinct species. However, the differences are not without horticultural significance, and the two taxa are consistently recognized in horticultural literature. In a few floristic works, additional varieties of dubious taxonomic acceptability are listed, but these variants are not represented in horticulture, nor do their names have any bearing on the nomenclature of the more widely accepted taxa.

Most of the representatives of *S. reticulata* in cultivation in North America and Europe are derived from the Japanese populations, and are called Japanese Tree Lilacs. Plants derived from the continental Asiatic populations are also cultivated, although less frequently, and are known as Amur Lilacs.

When the genus *Syringa* was monographed by McKelvey in 1928, this species, as here circumscribed, was called *S. amurensis* Ruprecht. The Amur Lilac was the nominate variety, and the Japanese Tree Lilac was designated *S. amurensis* var. *japonica* (Maximowicz) Franchet & Savatier. In recent years, however, this species has been called *S. reticulata* (Blume) Hara, the epithet *reticulata* having seven years' priority over *amurensis*. The basionym, *Ligustrum reticulatum* Blume, was based on specimens from Japan; therefore, the Japanese Tree Lilac constitutes the nominate variety, and bears the autonym *S. reticulata* var. *reticulata*.

When Hara (1941) published the name *S. reticulata* for the species, he also published the combination *S. reticulata* var. *mandshurica* (Maximowicz) Hara for the Amur Lilac, this name having been based on *Ligustrina amurensis* α *mandshurica* Maximowicz. This basionym, however, is patently illegitimate, and therefore without standing in considerations of priority, under Article 63 and other provisions of the International Code of Botanical Nomenclature (ICBN).

¹Contribution No. 50 from the Royal Botanical Gardens, Hamilton, Ontario, Canada.

In Maximowicz's (1859) first work dealing with the tree lilacs, he treated all of the continental Asian members of this group as *Syringa amurensis* Ruprecht, comprising two varieties (Article 35.3, ICBN): α *genuina*, reported from several localities in the Amur watershed, and β *pekinensis*, based on *S. pekinensis* Ruprecht, from the vicinity of Beijing (then transliterated Pekin). Maximowicz first used the epithet *mandshurica* in this context in 1875, in a work dealing with the flora of Japan as well as of northeast China. The group as a whole was then called *Ligustrina amurensis* (Ruprecht) Ruprecht, with three subordinate taxa: α *mandshurica*, with its range given as Manchuria, extending to the Korean border; β *pekinensis*, from the vicinity of Beijing, and γ *japonica*, from Japan. From the use of " α ," the absence of any mention of [var.] *genuina*, and the range given for α *mandshurica*, it is evident that Maximowicz applied the epithet *mandshurica* to the typical subdivision of *L. amurensis*. This conclusion was reached by Korshinsky (1892), who treated the nominate variety of *Syringa amurensis* as "var. *mandshurica* (genuina) Maxim." (italicization Korshinsky's), and also by McKelvey (1928). Under the present rules of nomenclature, the names *Ligustrina amurensis* α *mandshurica* Maxim. and *Syringa amurensis* var. *mandshurica* (Maxim.) Korshinsky were nomenclaturally superfluous when published, and the priority of the epithet *mandshurica* at varietal rank therefore dates only from its use by Hara in 1941.

Furthermore, there was no description nor any reference to a description directly and exclusively associated with the taxon *mandshurica* by Maximowicz (1875). His statement that within *L. amurensis* "*formae tres distingui possint*" (emphasis mine) makes it questionable whether varietal rank can be assigned to *mandshurica* as of 1875.

Under the provisions of amendments to the ICBN dealing with autonyms, adopted at Sydney in 1981, Maximowicz's naming of *Syringa amurensis* [var.] *pekinensis* in 1859 automatically established a var. *amurensis*, even though Maximowicz at that time called the taxon [var.] *genuina*. These recent amendments provide that the epithet of the autonym *S. amurensis* var. *amurensis* has priority when the Amur Lilac is treated as a variety of *S. reticulata*. The following new combination is therefore required:

Syringa reticulata (Blume) Hara var. *amurensis* (Ruprecht) Pringle, comb. nov. Basionym: *Syringa amurensis* Ruprecht, Bull. Cl., Phys.-Math. Acad. Imp. Sci. Saint-Petersbourg, ser. 2, 15:371. 1857.

Since the name *S. reticulata* var. *mandshurica* has been used with increasing frequency in recent years, this new combination does result in an unfortunate element of nomenclatural instability. Conversely, however, it restores a familiar epithet that was associated with the Amur Lilac for many years and is still frequently encountered. Also, it is conducive to nomenclatural clarity that whether the Amur Lilac is treated as a variety of *S. reticulata* or as a distinct species, it will bear the same epithet. A notable benefit of the recent amendments to the ICBN is that it is no longer necessary, in this context, to be concerned with the identity of the type of the name *S. amurensis* var. *rotundifolia* (Decaisne) Lingelsheim (see McKelvey, 1928), since its problematical and unfamiliar epithet has priority at varietal rank only from 1920.

Literature Cited

- Hara, H. 1941. Observationes ad plantas Asiae orientalis XVII. J. Jap. Bot. 17:18-26.
- Korshinsky, S.I. 1892. Plantas amurenses in itinere anni 1892 collectas enumerat novasque species describit. Trudy Imp. S.-Peterburgsk. Bot. Sada (Acta Horti Petrop.) 12:287-431.
- Maximowicz, C.J. 1859. Primitiae florum amurensis. Versuch einer Flora des Amurlandes. Mem. Acad. Imp. Sci. St. Pétersbourg Divers Savants 9:1-504, pl. 1-10 + 1 map.
- McKelvey, S.D. 1928. The Lilac: a Monograph. New York: The Macmillan Company. xvi + 581 pp. + 171 pl. + 4 charts.

A WHITE-FLOWERED ERYTHRINA HERBACEA L. (FABACEAE)
FROM THE GULF COAST OF FLORIDA

David W. Crewz and Mark D. Moffler
Florida Department of Natural Resources
Marine Research Laboratory
100 Eighth Avenue S. E.
St. Petersburg, Florida 33701

A white-flowered specimen of the normally red-flowered Erythrina herbacea L. was observed growing at the margin of a coastal thicket at Fort DeSoto Park, Pinellas County, Florida. The plant consists of several stems approximately 10 cm in diameter and 3 m in height. A search of the area did not reveal any other white-flowered plants, although the red-flowered form was very common. Limited observations through two reproductive periods did not reveal any potential pollinators visiting the flowers although ants were occasionally observed around the inflorescence.

Erythrina herbacea L. f. albiflora Moffler and Crewz, forma nova

Differt a forma rubra floribus albis pro rubris habet. Holotype: Florida: Pinellas County: Fort DeSoto Park: at margin of wooded area on St. Jean Key, west of State Road 693 (T33s, R16E, sec. 8). Associates include Quercus geminata, Sabal palmetto, and Dalbergia ecastophyllum. David W. Crewz 2132 (STPE). An isotype is in the herbarium of the University of South Florida (USF).

ADDITIONAL NOTES ON THE GENUS AEGIPHILA. XXXI

Harold N. Moldenke

AEGIPHILA ANOMALA Pittier

Additional bibliography: Mold., Phytologia 52: 239. 1982.

Knapp and his associates describe this as a tree, 10—20 m. tall, the "stems" bright-brown-pubescent, and the corollas white. They have found it growing in tropical wet forests and premontane rain-forests, at 650—1000 m. altitude, in anthesis in March and May.

Additional citations: PANAMA: Coclé: Knapp 5300 (Ld). Panamá: Knapp, Foster, Mallet, & Huft 4514 (Ld).

AEGIPHILA HIRSUTISSIMA Mold.

Additional bibliography: Mold., Phytologia 52: 251. 1982.

Material of this species has been misidentified and distributed in some herbaria as A. longifolia Turcz. On the other hand, the Forero & Jaramillo 2561, distributed as A. hirsutissima, actually seems to be A. hoehnei var. spectabilis Mold.

Additional citations: VENEZUELA: Miranda: Liesner & González 9213 (E—2939785); Steyermark & Davidse 116323 (E—2779945). Táchira: Berti & Peña 154-980 (Ld). GUYANA: Persaud 90 (N).

AEGIPHILA HOEHNEI Mold.

Additional bibliography: Mold., Phytol. Mem. 2: 137 & 520. 1980; Mold., Phytologia 46: 328 (1980), 50: 244 (1982), and 52: 245. 1982.

Recent collectors describe this species as a treelet, 4 m. tall, or as a vine, with yellow-green buds and orange-colored fruit, and have found it growing in mature forests and along creeks, at 210 m. altitude, in flower in September and in fruit in August.

Material has been misidentified and distributed in some herbaria as Rubiaceae sp. On the other hand, the Forero & Jaramillo 2505, distributed as A. hoehnei, actually is A. deppeana Steud.

Additional citations: PERU: Loreto: Gentry, Vasquez, & Jaramillo 29798 (Ld). BRAZIL: Amazonas: Berg, Steward, & Ramos P.18799 (W—2886145).

AEGIPHILA HOEHNEI var. PUYENSIS Mold.

Additional bibliography: Mold., Phytologia 46: 328. 1980; Mold., Phytol. Mem. 2: 127 & 520. 1980.

AEGIPHILA HOEHNEI var. SPECTABILIS Mold.

Additional bibliography: Mold., Phytologia 46: 328 (1980) and 50: 244. 1982.

Recent collectors describe this plant as a shrub, 1—3 m. tall, or a liana, 3—4 m. long, the leaves coriaceous, the inflores-

cence green, and the fruit at first green, later yellow, finally orange. They have encountered the plant in secondary woods, tropical wet forests, low cloud forests, and disturbed cloud forests, at 45--1000 m. altitude, in fruit from August to October and December.

The Knapp & Schmalzel collection, cited below, is anomalous in having very thin-membranous leaf-blades, but the specimens were apparently collected when the inflorescence was at the very start of anthesis. It was erroneously distributed as Malpighiaceae sp. Other material of A. hoehnei var. spectabilis has been misidentified and distributed in some herbaria as A. hirsutissima Mold.

Additional citations: PANAMA: Colón: Knapp & Schmalzel 1799 (Ld). Panamá: Knapp 903 (Ld); Sullivan 193 (Ld); Sytsma 1428 (Ld); Sytsma, Hahn, & Antonio 2859 (Ld). COLOMBIA: Chocó: Forero & Jaramillo 2561 (N).

AEGIPHILA HOEHNEI var. VENEZUELENSIS Mold.

Additional bibliography: Mold., Phytologia 46: 328. 1980; Mold., Phytol. Mem. 2: 113 & 520. 1980.

AEGIPHILA HOFFMANNIOIDES Standl. & Steyerl.

Additional bibliography: Mold., Phytologia 40: 226. 1978; Mold., Phytol. Mem. 2: 70 & 520. 1980.

AEGIPHILA INSIGNIS Mold.

Additional bibliography: Mold., Phytologia 40: 226--227. 1978; Mold., Phytol. Mem. 2: 131 & 520. 1980.

AEGIPHILA INTEGRIFOLIA (Jacq.) Jacq.

Additional & emended bibliography: J. F. Gmel. in L., Syst. Nat., ed. 13, imp. 2, 2: 246 & 259. 1791; G. Don in Sweet, Hort. Brit., ed. 3, 550. 1839; Walp., Repert. Bot. Syst. 4: 122, 126, 130, & 131. 1845; Bocq. in Baill., Rec. Obs. Bot. 3: 190 & 264, pl. 9, fig. 12--14. 1863; Pio Corrêa, Dicc. Pl. Uteis Bras. 2: 50. 1931; Mold., Phytol. Mem. 2: 82, 98, 103, 106, 113, 121, 125, 127, 131, 137, 173, 344, 369--371, 377, 423, & 520. 1980; Mold., Phytologia 47: 135 (1980) and 50: 244 & 248. 1982.

Recent collectors describe this plant as a shrub, 2 m. tall, or as a "heliophilous shrubby tree", 2--6 m. tall, the trunk 12 cm. in diameter, the bark pale-yellowish with small vertical rows of rusty-red lenticels, the slash soft and cream-color, the young stems sharply tetragonal, the stems and leaves with an unpleasant smell, and the fruit vermilion "e sementes pretas", and have found it growing in poorly drained forests, in firm wet clay soil in low caopreira near Igarapés, in open areas, in disturbed dry forests, among secondary vegetation, and, according to Buschbacher, "typically found in pastures as sprouts". He records the vernacular name, "comida de danto". It has been collected by recent botanists at 100--700 m. altitude, flowering in March, June, August, and October, and in fruit in February and August.

The corollas are said to have been "white" on Albuquerque & al.

1239, Aristeguieta 3916, Beck 8274, Gentry & Berry 14654, Huashikat 245, Mathias & Taylor 5310, and Krapovickas & Schinini 36127, "cream"-color on Lowrie & al. 659, and "yellowish-white" on Steinbach 776.

Albuquerque and his associates describe the plant as "frequent". Pío Corrêa (1931) lists a vernacular name, "bois de golette", from French Guiana, as well as "carindiba" from Brazil. He notes that "Tem as variedades breviflora e longiflora; qualquer destas ou a especie-tipo, na Amazonia e no Rio de Janeiro".

It should be pointed out here that the leaves on some French Guiana collections cited below, notably Oldeman B.3368, resemble those of A. sellowiana Cham. in some respects and it may be that these two species hybridize.

Material of A. integrifolia has been misidentified and distributed in some herbaria as Clerodendrum sp., Cornutia sp., Mostuea brasiliensis Huber, and Rubiaceae sp.

Additional citations: COLOMBIA: Antioquia: Shepherd 567 (Ws). VENEZUELA: Amazonas: Buschbacher 55 (Ld). Bolívar: C. Blanco (N); Gentry & Berry 14654 (Ld), 14927 (E-2464542, Ld), 15070 (E-2464543, Ld). Guárico: Aristeguieta 6302 (W-2925983). Monagas: Aristeguieta 3916 (N, W-2925973). Zulia: Bunting 6814 (Ld); Bunting & Alfonso G. 6892 (Ld); Bunting & Fucci 8368 (Ld). FRENCH GUIANA: Granville 4483 (Ld); Grenand 1980 (Ld); Oldeman 1279 (Cy), 1464 (Cy), 3029 (Cy), B.3368 (P), T.832 (Cy, Cy). ECUADOR: Pastaza: Léjtnant & Molau 13356 (Ac), 13451 (Ac). PERU: Amazonas: Huashikat 244 (Ld), 245 (Ld); Mathias & Taylor 5310 (W-2653178). Huánuco: Humbert 31023 (N). BRAZIL: Acre: Albuquerque, Mota, & Olivieri 1239 (Ld, N); Lowrie, Lowry, & Nelson 659 (Ld). Rio de Janeiro: Lira & al. 397 [Herb. FERMA 19165] (Lc). BOLIVIA: El Beni: S. G. Beck 8274 (Ld). Santa Cruz: Krapovickas & Schinini 36127 (Ld); R. F. Steinbach 776 (N).

AEGIPHILA INTEGRIFOLIA var. GUIANENSIS (Mold.) López-Palacios

Additional bibliography: Mold., *Phytologia* 46: 329. 1980; Mold., *Phytol. Mem.* 2: 106, 113, 121, 137, 369, 370, & 52. 1980.

Recent collectors have encountered this plant in thickets and secondary mountain vegetation, at 200 m. altitude, flowering in September, and fruiting in July. They describe it as a small tree, 4-8 m. tall, the anthers brown, the filaments white, and the fruit green (in July). They report the vernacular name, "tabaquillo". The corollas are said to have been "white" on Davidse & al. 18201 and Liesner & González 5776.

Additional citations: VENEZUELA: Amazonas: Schultes & López 8260 (Ws). Aragua: Davidse, Huber, & Rollet 16699 (Ld). Bolívar: Liesner & González 5776 (Ld). Guárico: Aristeguieta 6302 (N). Sucre: Steyermark, Manara, & Morillo 108631 (N). Zulia: Davidse, González, & León 18201 (Ld). BRAZIL: Pará: Silva & Santos 4602 (N).

AEGIPHILA INTEGRIFOLIA var. **LOPEZ-PALACII** Mold.

Additional bibliography: Mold., *Phytol. Mem.* 2: 127, 173, 371, & 520. 1980; Mold., *Phytologia* 46: 329—330 (1980) and 50: 248. 1982.

Recent collectors describe this plant as 1.2 m. tall, with orange-colored fruit, and have found it growing in matorral, at 170 m. altitude, in both flower and fruit in April. The corollas are said to have been "yellowish" on Krapovickas & Schinini 34805 and "white" on Krapovickas & Schinini 36198.

Additional citations: BOLIVIA: El Beni: Krapovickas & Schinini 34805 (Ld). Santa Cruz: Krapovickas & Schinini 36198 (W—2904420).

AEGIPHILA INTERMEDIA Mold.

Additional bibliography: Mold., *Phytol. Mem.* 2: 106, 113, 137, & 520. 1980; Mold., *Phytologia* 46: 330. 1980.

Recent collectors refer to this species as a shrub, 3 m. tall, and have found it growing in clay soil of virgin forests on terra firme, in anthesis in August. The corollas are said to have been "white" on Rodriguez & Chagas 4077.

Additional citations: BRAZIL: Amazonas: Ducke 136 (W—2592950); Rodrigues & Chagas 4077 [*Herb. Inst. Nac. Pesq.* 10642] (N). Pará: Silva & Bahia 2938 (N).

AEGIPHILA KILLIPII Mold.

Additional bibliography: Mold., *Phytol. Mem.* 2: 106 & 520. 1980; Mold., *Phytologia* 46: 330. 1980.

AEGIPHILA LAETA H.B.K.

Additional bibliography: Bocq. in *Baill.*, *Rec. Obs. Bot.* 3: 190. 1863; Mold., *Phytologia* 46: 330 & 336. 1980; Mold., *Phytol. Mem.* 82, 85, 106, 113, & 520. 1980.

Recent collectors describe this plant as a shrub or treelet, 0.8—2.5 m. tall, the branches and leaves opposite, the flowers small, tubular, borne in "terminal cymes", and the fruit orange in color. They have found it in flower in July and October and in fruit in January and October, growing in tropical dry forests and abandoned farmlands, from sealevel to 100 m. altitude. The corollas are said to have been "cream"-color on Hammel & D'Arcy 5001.

Additional citations: PANAMA: Panamá: Knapp 3283 (Ld). San Blas: Hammel & D'Arcy 5001 (E—2889936). COLOMBIA: Atlántico: Dugand 5736 (W—2454237).

AEGIPHILA LAEVIS (Aubl.) Gmel.

Additional & emended bibliography: J. F. Gmel. in *L.*, *Syst. Nat.*, ed. 13, imp. 2, 2: 259. 1791; G. Don in *Sweet*, *Hort. Brit.*, ed. 3, 550. 1839; Walp., *Repert. Bot. Syst.* 4: 119—120. 1845; Bocq. in *Baill.*, *Adansonia*, ser. 1 [*Rec. Obs. Bot.*] 3: 190 & 264, pl. 9, fig. 11. 1863; Briq. in *Engl. & Prantl*, *Nat. Pflanzenfam.*, ed. 1, 4 (3a): 166. 1895; Mold., *Phytol. Mem.* 2: 106, 113, 121, 124, 125, 137, 344, & 521. 1980; Mold., *Phytologia* 46: 330—331. 1980.

Additional illustrations: Bocq. in Baill., Adansonia, ser. 1 [Rec. Obs. Bot.] 3: pl. 9, fig. 11. 1863.

Recent collectors describe this plant as a riverine, woody or somewhat woody liana, the wood white, all the branches orthotropous, "l'écorce gris foncé ou rougeâtre écailleuse, feuilles vert foncé, brillantes en dessus, vert un peu clair et assez brillantes avec une puberulence grisâtre très clairsemée en dessous", the flowers odorous, the corolla "greenish-white" in bud, "cream"-color during anthesis, and "yellow" when old, the stamens greenish-white, the anthers light-brown, "les fleurs doubles et transitions avec simples (8 dents de la corolle), 4 courtes et 4 longues étamines", the buds green, and the fruit yellow (in June).

Material has been misidentified and distributed in some herbaria as Bignoniaceae sp. or Hippocrateaceae sp.

Additional citations: FRENCH GUIANA: Granville B.5469 (Ld); Oldeman 2398 (Cy, Cy), 3216 (Cy, Cy).

AEGIPHILA LANATA Mold.

Additional bibliography: Mold., Phytologia 25: 413. 1973; Mold., Phytol. Mem. 2: 137 & 521. 1980.

Héringer describes the flowers of this plant as fragrant and the corollas "cream"-color. He found it in anthesis in December and reports that the fruits are eaten by birds and rats.

Additional citations: BRAZIL: Distrito Federal: Héringer 15580 (W--2926776), 18076 (W--2926795).

AEGIPHILA LANCEOLATA Mold.

Additional bibliography: Mold., Phytol. Mem. 2: 131, 137, 176, 184, 344, & 521. 1980; Mold., Phytologia 46: 331. 1980.

It seems to me that this taxon merely represents a form of A. vitelliniflora Klotzsch or, at most, a variety of it.

Additional citations: BRAZIL: Minas Gerais: Macedo 2055 (W--2196788). Paraná: Hatschbach & Guimares 19047 (Ba, Ba).

AEGIPHILA LAXICUPULIS Mold.

Additional bibliography: F. C. Seymour, Phytol. Mem. 1: 242. 1980; Mold., Phytol. Mem. 2: 59, 70, 75, 77, 78, 371, & 521. 1980; Mold., Phytologia 47: 47 & 48 (1980) and 52: 247. 1982.

Stevens refers to this plant as scandent, with pale-yellow corollas (no. 9958) and orange-colored fruit, and found it growing along fencerows between fields and in small patches of evergreen forest along streams, at 200--960 m. altitude, in fruit in February.

The German & al. 717, distributed as A. laxicupulis, actually is A. falcata Donn. Sm.

Additional citations: NICARAGUA: Esteli: W. D. Stevens 9958 (Ld). Zelaya: W. D. Stevens 12211 (Ld).

AEGIPHILA LAXIFLORA Benth.

Additional & emended bibliography: Walp., Repert. Bot. Syst. 4: 120. 1845; Mold., Phytol. Mem. 2: 103, 113, 12, 371, & 521. 1980;

Mold., *Phytologia* 46: 331. 1980.

Recent collectors describe this species as a small shrub or treelet, 4--5 m. tall, with a trunk diameter to 7 cm. at breast height, and have found it growing on savannas and in semihumid forests, at 260--290 m. altitude, the fruit yellowish in July. They have found it in flower in April and May. The corollas are said to have been "yellow" on Marcano-Berti 743. The vernacular name, "tabaquillo", has been recorded.

Additional citations: VENEZUELA: Bolívar: Delascio Ch. & Liesner 7344 (E--2774719); Marcano-Berti 743 (E--2774721). GUYANA: D. H. Davis 766 (N).

AEGIPHILA LEHMANNII Mold.

Additional bibliography: Mold., *Phytol. Mem.* 2: 106 & 521. 1980; Mold., *Phytologia* 46: 331. 1980.

AEGIPHILA LEWISIANA Mold.

Additional bibliography: Mold., *Phytol. Mem.* 2: 113 & 52. 1980; Mold., *Phytologia* 46: 331. 1980.

Aristeguieta refers to this plant as a few-branched treelet, to 5 m. tall, and found it in fruit in September.

Additional citations: VENEZUELA: Guárico: Aristeguieta 5155 (N).

AEGIPHILA LHOTZKIANA Cham.

Additional bibliography: Walp., *Repert. Bot. Syst.* 4: 121. 1845; Bocq. in Baill., *Adansonia*, ser. 1 [Rec. Obs. Bot.] 2: 190. 1863; Mold., *Phytol. Mem.* 2: 137, 370--372, & 521. 1980; Mold., *Phytologia* 46: 331--332 (1980) and 49: 475. 1981.

Recent collectors describe this species as a shrub, 1--1.5 m. tall, or treelet, 3 m. tall, the mature fruit orange in color. They have encountered the plant in cerrado, in dark-red soil, on campo and campo rupestre, as well as on raised hummocks in open grassy savannas and on savannas dominated by Axonopus sp., Bulbo-stylis paradoxa, and Curatella americana, the trees and shrubs widely spaced as single individuals, and surrounding forest, at 1000--1200 m. altitude, in flower in January and October, and in fruit in January and February. Anderson refers to it as "occasional". The corollas are said to have been "white" on Anderson & al. 6971 & 7255, "yellow" on Héringer & al. 5675, and "light-yellow, anthers darker" on Héringer & al. 5722.

Material of *Aegiphila lhotzkiana* has been misidentified and distributed in some herbaria as "*Aegiphila minutiflora* Rusby ex Mold.", a synonym of *Callicarpa acuminata* H.B.K., and as *A. selowiana* Cham.

Additional citations: BRAZIL: Amapá: Austin, Nauman, Secco, Rosário, & Santos 6981 (N), 7255 (Ld, N). Amazonas: W. R. Anderson 11796 (M1, W--2934474). Bahia: Mori 13283 (Ld, N); Mori, Silva, Kallunki, Santos, & Santos 9655 (N). Distrito Federal: Héringer, Figueiras, Mendonça, Pereira, Salles, & Chagras e Silva 2876 (W--2926609), 5675 (W--2926823), 5722 (W--2926820, W--2926821). Minas

Gerais: Macedo 2032 (W—2196776). Pará: Cavalcante 3018 (N); Davidse, Rosa, Rosário, & Silva 17652 (N).

AEGIPHILA LONGIPETIOLATA Mold.

Additional bibliography: Mold., *Phytologia* 40: 234. 1978; Mold., *Phytol. Mem.* 2: 131 & 521. 1980.

AEGIPHILA LOPEZ-PALACII Mold.

Additional bibliography: Mold., *Phytol. Mem.* 2: 127, 371, & 521. 1980; Mold., *Phytologia* 46: 332. 1980.

AEGIPHILA LOPEZ-PALACII var. **PUBESCENS** Mold.

Additional bibliography: Mold., *Phytologia* 46: 332. 1980; Mold., *Phytol. Mem.* 2: 127, 371, & 521. 1980.

AEGIPHILA LUSCHNATHI Schau.

Additional bibliography: Mold., *Phytol. Mem.* 2: 137, 344, & 521. 1980; Mold., *Phytologia* 46: 332. 1980.

AEGIPHILA MACRANTHA Ducke

Additional synonymy: Aegiphila scandens Anderson ex Mold., *Phytologia* 50: 256, in syn. 1982 [not A. scandens Mold., 1934].

Additional bibliography: Egler, *Bol. Mus. Para. Goeldi*, ser. 2, Bot. 18: 29. 1963; Mold., *Phytol. Mem.* 2: 103, 113, 121, 125, 137, & 521. 1980; Mold., *Phytologia* 46: 332 (1980) and 50: 247 & 256. 1982.

Recent collectors have found this plant growing in forests and at forest margins, describing it as a 5—6 m. tall liana, the fruit green (in April). Gentry & Berry refer to it as a "tree", 5 m. tall, the "calyxes brown". The corollas are said to have been "cream"-color on France & al. 9401.

Material of this species has been misidentified and distributed in some herbaria as *Convolvulaceae* sp.

Additional citations: VENEZUELA: Bolívar: Gentry & Berry 15003 (E—2464539). BRAZIL: Bahia: Mori, Santos, Euponino, & Langenheim 11862 (N); Plowman, Mattos Silva, & Santos 10069 (N). Roraima: France, Steward, Ramos, & Farias 9401 (N).

AEGIPHILA MAGNIFICA Mold.

Additional bibliography: Mold., *Phytologia* 47: 47—48. 1980; Mold., *Phytol. Mem.* 2: 70, 78, 80, 82, 371, & 521. 1980; F. C. Seymour, *Phytol. Mem.* 1: 242. 1980.

AEGIPHILA MAGNIFICA var. **PUBESCENS** Mold.

Additional bibliography: Mold., *Phytologia* 40: 235 & 332. 1978; Mold., *Phytol. Mem.* 2: 80, 82, & 521. 1980.

It is very likely that the Central American collections cited previously as A. mollis H.B.K. may, instead, represent the present taxon, or, alternatively, that the present taxon may be a form or variety of A. mollis.

AEGIPHILA MARTINICENSIS Jacq.

Additional synonymy: Algiphila martinicensis Stahl, Estud. Fl. Puerto Rico, ed. 1, 3: 336. 1888. Algiphila glabra Stahl, Estud. Fl. Puerto Rico, ed. 1, 3: 336, in syn. 1888. Aegiphila martiniquensis Jacq., ex Virkki, Journ. Agric. Univ. P. Rico 63: 50. 1979. Aegiphila martinicensis var. martinicensis [Jacq.] ex J. T. & R. Kartesz, Syn. Checklist Vasc. Fl. 2: 465. 1980.

Additional & emended bibliography: J. F. Gmel. in L., Syst. Nat., ed. 13, imp. 2, 2: 259. 1791; Desf., Cat. Pl. Hort. Paris, ed. 3, 391. 1829; G. Don in Sweet, Hort. Brit., ed. 3, 550. 1839; Walp., Repert. Bot. Syst. 4: 119 & 124. 1845; Bocq. in Baill., Adansonia, ser. 1 [Rec. Obs. Bot.], 3: 189, 190, & 264, pl. 9, fig. 1--10. 1863; Stahl, Estud. Fl. Puerto Rico, ed. 1, 3: 300 & 336. 1888; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 166. 1895; Millsp., Field Columb. Mus. Publ. Bot. 1: 523. 1902; Urb., Symb. Antill. 4: 536--537. 1911; Stahl, Estud. Fl. Puerto Rico, ed. 2, 3: 300 & 336. 1937; Virkki, Journ. Agric. Univ. P. Rico 63: 50 & 65. 1979; Mold., Phytologia 46: 323, 332--333, & 336. 1980; Mold., Phytol. Mem. 2: 82, 87, 92, 97, 99--101, 103, 106, 113, 125, 344, 370, 371, & 521. 1980; F. C. Seymour, Phytol. Mem. 1: 242. 1980; Virkki & Zambrana, Journ. Agric. P. Rico 64: 75, 76, 81, 84, 89, 264, 265, 267, 269, & 271--273, fig. 4 (top). 1980; J. T. & R. Kartesz, Syn. Checklist Vasc. Fl. 2: 465. 1980; Mold., Phytologia 50: 256 (1982) and 52: 118. 1982.

Recent collectors describe this plant as a shrub, 1--2 m. tall, the flowers with a musky odor, and have found it growing in hillside thickets, in tall forests, lowland rainforests, and cut-over forest edges, at sealevel to 1000 m. altitude, in flower in January and from August to October. The corollas are said to have been "white" on Liogier & al. 28016, "yellowish-white" on Knapp 1342, "cream-white" on Liogier & al. 31489, and "cream"-color on Folsom 5822, Fosberg 58941, and Hammel 4338. Fosberg refers to the plant as "occasional in wooded ravines" on St. Croix; Millspaugh (1902) also lists it from St. Croix. Virkki & Zambrana (1980) report that in Puerto Rico the plant is often infested by the Puerto Rican flea-beetle, Alagoasa bicolor.

Additional citations: PANAMA: Coclé: Folsom 5822 (E--2889905). Colón: Knapp 1342 (Id). Veraguas: Hammel 4338 (E--2904984). PUERTO RICO: Liogier, Liogier, & Martorell 28016 (N); Liogier, Liogier, & Solano 31489 (N); Woodbury s.n. [Nov. 6, 1965] (N). VIRGIN ISLANDS: St. Croix: Fosberg 58941 (W--2889566).

AEGIPHILA MARTINICENSIS var. **BARBADENSIS** (Mold.) Mold.

Additional bibliography: Mold., Phytologia 40: 327. 1978; Mold., Phytol. Mem. 2: 101, 370, & 521. 1980.

AEGIPHILA MARTINICENSIS var. **OLIGONEURA** (Urb.) Mold.

Additional bibliography: Mold., Phytologia 40: 328. 1978; J. T. & R. Kartesz, Syn. Checklist Vasc. Fl. 2: 465. 1980; Mold., Phytol. Mem. 2: 92, 97, 100, 101, 344, & 521. 1980.

AEGIPHILA MATTOGROSSENSIS Mold.

Additional bibliography: Mold., *Phytologia* 40: 328. 1978; Mold., *Phytol. Mem.* 2: 137 & 521. 1980.

AEGIPHILA MEDITERRANEA Vell.

Additional & emended bibliography: Walp., *Repert. Bot. Syst.* 4: 122--124. 1845; Mold., *Phytologia* 46: 333. 1980; Mold., *Phytol. Mem.* 2: 137, 184, 344, & 521. 1980.

Additional citations: BRAZIL: Guanabara: Duarte 5024 (Mu).

AEGIPHILA MEDITERRANEA var. **BREVILOBATA** Mold.

Additional bibliography: Mold., *Phytologia* 40: 328 & 395. 1978; Mold., *Phytol. Mem.* 2: 137, 184, & 521. 1980.

AEGIPHILA MEDULLOSA Mold.

Additional bibliography: Mold., *Phytologia* 27: 150. 1973; Mold., *Phytol. Mem.* 2: 137 & 521. 1980.

AEGIPHILA MEMBRANACEA Turcz.

Additional bibliography: Mold., *Phytologia* 46: 333. 1980; Mold., *Phytol. Mem.* 2: 106, 113, 124, 125, 131, 137, 371, & 521. 1980.

Recent collectors refer to this plant as a small tree, 4--6 m. tall, shrub, 2--4 m. tall, woody vine, or even an herb, 1 m. tall, the bark light-gray or green and white-spotted, the wood white, the inflorescence pendent and green, terminal, the flower-buds green or light-yellow, the fruiting-calyx green, and the fruit at first green or yellowish-green, then light-yellow. They have found the plant growing in "forêt dense sur sol pei épais" with granitic rocks and also in secondary vegetation, at 100--200 m. altitude, in flower in June and July and in fruit in March and August, reporting the vernacular name, "tabaquillo". The corollas are said to have been "yellow" on Bunting & Arboleda L. 8122.

It is worth noting here that the French Guiana specimens that are in fruit show entire-margined fruiting-calyxes similar to those seen in A. panamensis Mold.

Additional citations: VENEZUELA: Bolívar: Gentry & Berry 14707 (E-2464549); Liesner & González 5987 (Ld). Zulia: Bunting & Arboleda L. 8122 (Ld). FRENCH GUIANA: Granville 2813 (Cy, Cy), B. 4934 (Cy, Cy); Lescure 191 (Cy, Cy); Oldeman B.4348 (Cy).

AEGIPHILA MEMBRANACEA var. **BOLIVIANA** Mold.

Additional bibliography: Mold., *Phytologia* 46: 333. 1980; Mold., *Phytol. Mem.* 2: 173 & 521. 1980.

AEGIPHILA MICROCALYCINA Mold.

Additional bibliography: Mold., *Phytologia* 40: 330. 1978; Mold., *Phytol. Mem.* 2: 137 & 521. 1980.

AEGIPHILA MINASSENSIS Mold.

Additional bibliography: Mold., *Phytologia* 27: 151--152. 1973; Mold., *Phytol. Mem.* 2: 137 & 1980.

AEGIPHILA MOLDENKEANA López-Palacios

Additional bibliography: Mold., Phytol. Mem. 2: 106 & 113. 1980; Mold., Phytologia 47: 48. 1980.

Bernardi found this plant growing at 1600--2200 m. altitude and it has been misidentified and distributed in some herbaria as Solanaceae sp.

Additional citations: VENEZUELA: Mérida: Bernardi 2205 (N).

AEGIPHILA MOLLIS H.B.K.

Additional & emended bibliography: Walp., Repert. Bot. Syst. 4: 122--123. 1845; Bocq. in Baill., Rec. Obs. Bot. 3: 190. 1863; Baill., Hist. Pl. 11: 87 & 95, fig. 101 & 102. 1891; Briq. in Engl. & Prantl., Nat. Pflanzenfam., ed. 1, 4 (3a): 143. 1895; Pio Corrêa, Dicc. Pl. Uteis Bras. 2: 369. 1931; Mold., Phytologia 47: 48. 1980; Mold., Phytol. Mem. 2: 80, 82, 106, 113, 124, 137, 138, 371, 372, & 621. 1980.

Additional & emended illustrations: Baill., Hist. Pl. 11: 87, fig. 101 & 102. 1891.

Recent collectors refer to this plant as a shrub, 1--2.5 m. tall, the tips of the flowering branches pendent, the calyx green, the flower-buds whitish, and the fruit yellow.

Additional citations: PANAMA: Chiriquí: Caballero 33 (E--2904990); Mori & Dressler 7899 (Ld). VENEZUELA: Guárico: Davidse 4170 (Ws). Táchira: Liesner & Guariglia 11808 (Ld). Yaracuy: Gentry & Puig-Ross 14400 (E--2462433).

AEGIPHILA MOLLIS var. **INTERMEDIA** Mold.

Additional bibliography: Mold., Phytologia 46: 334. 1980; Mold., Phytol. Mem. 2: 106, 113, 124, 371, & 521. 1980.

AEGIPHILA MOLLIS var. **LONGIFOLIA** (Turcz.) López-Palacios

Additional bibliography: Mold., Phytologia 46: 334. 1980; Mold., Phytol. Mem. 2: 106, 137, 371, & 521. 1980.

The Persaud 99, distributed as this taxon, actually is the related A. hirsutissima Mold.

AEGIPHILA MOLLIS var. **PUBERULENTA** (Mold.) López-Palacios

Additional bibliography: Mold., Phytol. Mem. 2: 106, 113, 371, & 521. 1980; Mold., Phytologia 46: 334. 1980.

AEGIPHILA MOLLIS var. **SURFACEANA** (Mold.) Mold.

Additional bibliography: Mold., Phytol. Mem. 2: 113, 138, 371, 372, & 521. 1980; Mold., Phytologia 46: 334. 1980.

Recent collectors refer to this plant as a semi-scandent shrub, frequent in wet sandy soil in low woods, the "flowers" greenish in December.

Additional citations: BRAZIL: Amazonas: Rodrigues & Coêlho 5223 [Herb. Inst. Nac. Pesq. Amaz. 13892] (N).

AEGIPHILA MONSTROSA Mold.

Additional synonymy: Aegophylla monstrosa Mold., Phytologia 52:

127, in syn. 1982.

Additional bibliography: Mold., Phytol. Mem. 2: 59, 70, 73, 75, 372, & 521. 1980; Mold., Phytologia 46: 334--335 (1980) and 50: 240 & 242. 1982.

Sousa, in a personal communication to me, records this species from Quintana Roo, Mexico.

Recent collectors describe the plant as a soft-wooded shrub, 3 m. tall, or a tree, 4--6.5 m. tall, the stems to 15 cm. in diameter at breast height, caulifructose, the wood very weak, the calyx green, and the fruit orange. They have encountered it among secondary growth, on rocky riverbanks, in high forests and high evergreen forests, as well as montane rainforests on steep slopes, at 130--800 m. altitude, in anthesis in October and December, in fruit in March.

The corollas are said to have been "white" on Breedlove & Thorne 20944 and Ortiz 1458.

Additional citations: MEXICO: Chiapas: Breedlove & Thorne 20944 (Mi). Oaxaca: Perino 3179 (N). Tabasco: Ramos & Cowan 2689 (N). GUATEMALA: El Petén: Ortiz 1458 (W--2925255). BELIZE: Gentle 263 (W--1636842). NICARAGUA: Jinotega: Stevens, Beach, Schal, & Momtiel 16759 (Ld).

AEGIPHILA MONTANA Mold.

Additional bibliography: Mold., Phytologia 46: 335. 1980; Mold., Phytol. Mem. 2: 106 & 521. 1980.

AEGIPHILA MONTICOLA Mold.

Additional bibliography: Mold., Phytol. Mem. 2: 127 & 521. 1980; Mold., Phytologia 46: 335. 1980.

AEGIPHILA MORTONI Mold.

Additional bibliography: Mold., Phytologia 46: 335. 1980; Mold., Phytol. Mem. 2: 131, 371, & 521. 1980.

AEGIPHILA MULTIFLORA Ruiz & Pav.

Additional & emended bibliography: Walp., Repert. Bot. Syst. 4: 118. 1845; Bocq. in Baill., Rec. Obs. Bot. 3: 190. 1863; Mold., Phytologia 46: 335. 1980; Mold., Phytol. Mem. 2: 127, 131, 173, 390, & 521. 1980.

Davidson describes this plant as a shrub, 2 m. tall, the corollas red-violet, and the stigmas white and "prominent" [=exserted?]. He found it growing in very wet montane subtropical rainforests (cloud forests), at 9550 feet altitude, flowering in November.

Additional citations: BOLIVIA: La Paz: Davidson 4929 (Mi).

AEGIPHILA NERVOSA Urb.

Additional bibliography: Urb. & Ekman in Ekman, Arkiv Bot. Stockh. 22A: 109. 1929; Mold., Phytologia 40: 335. 1978; Mold., Phytol. Mem. 2: 92, 94, & 521. 1982.

AEGIPHILA NOVOFRIBURGENSIS Mold.

Additional bibliography: Mold., *Phytologia* 27: 159. 1973; Mold., *Phytol. Mem.* 2: 138 & 521. 1982.

AEGIPHILA NOVOGRANATENSIS Mold.

Additional bibliography: Mold., *Phytol. Mem.* 2: 106, 127, 371, & 521. 1980; Mold., *Phytologia* 46: 335. 1980.

AEGIPHILA OBDUCTA Vell.

Additional & emended bibliography: Walp., *Repert. Bot. Syst.* 4: 121--122 & 124. 1845; Klein, *Sellowia* 31: 163. 1979; Mold., *Phytologia* 46: 335. 1980; Mold., *Phytol. Mem.* 2: 138, 344, 371, 372, & 521. 1980.

Additional citations: BRAZIL: Guanabara: Duarte 4964 (Mu). Parana: Hatschbach 24389 (Ba--370996), 32230 (Ba).

AEGIPHILA OBOVATA Andr.

Additional & emended bibliography: G. Don in Sweet, *Hort. Brit.*, ed. 3, 550. 1839; Mold., *Phytologia* 46: 335. 1980; Mold., *Phytol. Mem.* 2: 103, 344, & 521. 1980.

AEGIPHILA OBTUSA Urb.

Additional bibliography: Mold., *Phytologia* 40: 337. 1978; Mold., *Phytol. Mem.* 2: 92 & 521. 1980.

AEGIPHILA ODONTOPHYLLA Donn. Sm.

Additional bibliography: Mold., *Phytologia* 46: 335--336. 1980; Mold., *Phytol. Mem.* 2: 80, 82, 106, 113, 371, & 521. 1980.

Recent collectors refer to this plant as an infrequent straggly shrub, 3 m. tall, or tree, 4 m. tall, the young fruit green, and have encountered it in wet tropical forests, at 170--2550 m. altitude, in flower and fruit in June. The corollas are said to have been "white" on the Wilbur & Almeda and Utley collections cited below.

Additional citations: MEXICO: Veracruz: Gentry, Lott, & Botany Class 32461 (Ld). COSTA RICA: Alajuela: Brenes 5709a (It); Wilbur & Almeda 17495 (Mi). Cartago: Utley & Utley 5192 (Mi, N).

AEGIPHILA OVATA Mold.

Additional bibliography: Mold., *Phytologia* 40: 338. 1978; Mold., *Phytol. Mem.* 2: 131, 173, & 521. 1980.

AEGIPHILA PANAMENSIS Mold.

Additional bibliography: Mold., *Phytol. Mem.* 2: 59, 70, 75, 80, 82, 106, & 521. 1980; F. C. Seymour, *Phytol. Mem.* 1: 242. 1980; Mold., *Phytologia* 47: 48 (1980) and 52: 246. 1982.

Recent collectors describe this plant as a tree, 2--10 m. tall, a shrub, 2 m. tall, or even a woody vine, the leaves very dark-green, and the fruit oblate (apically flattened) and yellow to yellow-orange. They have found it growing in clearings, along roadsides and trailsides, on riverbanks, in forests and disturbed

forests, wet tropical forests, tropical "monsoon forests", forest edges, fencerows, and rather dry tropical lowland forests with Bursera and Pseudobombax, at altitudes from sealevel to 700 m., in flower from July to October and December, and in fruit in October and December. The corollas are said to have been "white" on Croat 12434, D'Arcy & Hammel 12256 & 12307, and Ebinger 243 & 954, as well as Hartman 12050, "cream" on Gentry 5623, Hammel & D'Arcy 5011, and Hammel & al. 4929 & 4939, and "greenish-cream" on Knapp 1887. Ebinger 954 is accompanied by a wood sample.

Material of this species has been misidentified and distributed in some herbaria as Rubiaceae sp. or Solanaceae sp. On the other hand, the Nelson & Romero 4194, distributed as A. panamensis, actually is A. elata Sw.

Additional citations: PANAMA: Canal Zone: Croat 12434 (Mi). Coclé: Ebinger 954 (W--2863925); Gentry 5623 (Mi). Colón: Hammel, Foster, & McDade 4929 (E--2889937), 4939 (Ld); Knapp 2720 (Ld); Knapp & Sytsma 2457 (Ld). Darién: Hartman 12050 (E--2889922), 12051 (E--2889921). Panamá: D'Arcy & Hammel 12307 (Ld); Knapp 1887 (Ld). San Blas: D'Arcy & Hammel 12256 (Ld); Hammel & D'Arcy 5011 (E--2889965), 5031 (Ld). Barro Colorado Island: Ebinger 243 (W--2863928).

AEGIPHILA PARAGUARIENSIS Briq.

Additional bibliography: Mold., Phytol. Mem. 2: 138, 176, 371, & 521. 1980; Mold., Phytologia 47: 48. 1980.

Recent collectors describe this plant as 50 cm. tall, and have found it growing on campo, flowering in January. The corollas are described as having been "white" on Krapovickas & Cristóbal 35381.

Additional citations: BRAZIL: Minas Gerais: Krapovickas & Cristóbal 35381 (Ld). Rondônia: Vieira, Zarucchi, Petersen, Ramos, & Mota 688 (N).

AEGIPHILA PARVIFLORA Mold.

Additional bibliography: Mold., Phytol. Mem. 2: 113, 138, 371, & 521. 1980; Mold., Phytologia 40: 336 (1980) and 50: 245. 1982.

Ramirez describes this plant as a medium-sized tree, the corollas white, and found it growing at the edges of low mata, in flower in May. He comments that "esta muestra tiene flores de estambres cortos". The Silva & Pinheiro 4416, distributed as A. parviflora, actually is A. crenata Mold.

Additional citations: VENEZUELA: Guárico: N. Ramirez 76 (Ld).

AEGIPHILA PAUCIFLORA Standl.

Additional bibliography: Mold., Phytol. Mem. 2: 127 & 521. 1980; Mold., Phytologia 40: 341 & 342 (1978) and 52: 244. 1982.

Illustrations: Mold., Phytologia 40: 342. 1978.

Gentry & Mori describe this plant as a small tree, 4 m. tall,

the [flower-]buds "cream"-color in January. They encountered it in the lower montane wet forest/premontane wet forest transition zone. It has been distributed erroneously to herbaria as A. costaricensis Mold.

Additional citations: PANAMA: Darién: Gentry & Mori 13802 (E—2462447).

AEGIPHILA PAVONIANA Mold.

Additional bibliography: Mold., Phytol. Mem. 2: 127 & 521. 1980; Mold., Phytologia 46: 336. 1980.

AEGIPHILA PENDULA Mold.

Additional bibliography: Mold., Phytologia 46: 288 & 336—337. 1980; Mold., Phytol. Mem. 2: 82, 113, 127, 131, 372, & 521. 1980.

AEGIPHILA PENDULA var. **PERUVIANA** Mold.

Additional bibliography: Mold., Phytologia 46: 288 & 337. 1980; Mold., Phytol. Mem. 2: 131 & 521. 1980.

AEGIPHILA PENNELLII Mold.

Additional bibliography: Mold., Phytol. Mem. 2: 106 & 521. 1980; Mold., Phytologia 46: 337. 1980.

AEGIPHILA PERNAMBUCENSIS Mold.

Additional bibliography: Mold., Phytologia 46: 337. 1980; Mold., Phytol. Mem. 2: 138 & 521. 1980.

AEGIPHILA PERPLEXA Mold.

Additional bibliography: Mold., Phytol. Mem. 2: 103, 113, & 522. 1980; Mold., Phytologia 46: 337. 1980.

AEGIPHILA PERUVIANA Turcz.

Additional bibliography: Mold., Phytol. Mem. 2: 106, 131, 138, 173, & 522. 1980; Mold., Phytologia 46: 325 & 337 (1980), 50: 246 (1982), and 52: 241. 1982.

Recent collectors describe this plant as a vine or as a shrub, 1.5 m. tall, with orange or bright-orange fruit in January and September, and have encountered it in montane rainforests and in secondary vegetation on varzea land, at 120—200 m. altitude, in flower and fruit in November. The corollas are said to have been "greenish-white" on Croat 51113 and on Jones & Davidson 9162.

The Williams 6152, previously cited as representing this species, seems better regarded as A. caucensis Mold.

Additional citations: PERU: Junín: Jones & Davidson 9162 (N). Loreto: Croat 20738 (Ld); Gentry & Ayala 15560 (Ld). San Martín: Croat 51113 (Ld).

AEGIPHILA PLATYPHYLLA Briq.

Additional bibliography: Mold., Phytologia 27: 355. 1973; Mold., Phytol. Mem. 2: 176 & 522. 1980.

AEGIPHILA PLICATA Urb.

Additional bibliography: Mold., *Phytologia* 27: 355. 1973; Mold., *Phytol. Mem.* 2: 92 & 522. 1980.

AEGIPHILA PULCHERRIMA Mold.

Additional bibliography: Mold., *Phytologia* 40: 343. 1978; Mold., *Phytol. Mem.* 2: 131 & 522. 1980.

AEGIPHILA PURPURASCENS Mold.

Additional bibliography: Mold., *Phytol. Mem.* 2: 127. 1980; Mold., *Phytologia* 46: 337. 1980.

AEGIPHILA QUINDUENSIS (H.B.K.) Mold.

Additional & emended bibliography: Walp., *Repert. Bot. Syst.* 4: 71. 1845; Mold., *Phytologia* 46: 337. 1980; Mold., *Phytol. Mem.* 2: 104, 106, 113, 371, 429, & 522. 1980.

AEGIPHILA RACEMOSA Vell.

Additional synonymy: Algiphila cuspidata Mart. ex Mold., *Phytologia* 50: 256, in syn. 1982.

Additional & emended bibliography: Walp., *Repert. Bot. Syst.* 4: 119 & 124. 1845; C. Muell. in Walp., *Ann. Bot. Syst.* 5: 710. 1860; Briq. in Engl. & Prantl, *Nat. Pflanzenfam.*, ed. 1, 4 (3a): 165, fig. 62 D—F. 1895; Mold., *Phytol. Mem.* 2: 106, 113, 121, 124, 125, 131, 138, 372, & 522. 1980; Mold., *Phytologia* 47: 48—49 (1980) and 50: 247 & 256. 1982.

Additional illustrations: Briq. in Engl. & Prantl, *Nat. Pflanzenfam.*, ed. 1, 4 (3a): 165, fig. 62 D—F. 1895; Mold., *Phytologia* 2: 441, fig. 4. 1948.

Recent collectors describe this plant as a shrub, 2--3 m. tall, or a vine, with fragrant flowers, and crowded fruit, 10--11 mm. in diameter, turning orange-color in age. They have found it growing in secondary thickets and among weedy roadside regeneration growth bordering mata alta with Vismia, Palicourea, Mimosa, etc., in flower in February, March, and June. The corollas are said to have been "cream"-color on Plowman & al. 9444 and "pale-yellow" on Rabelo 355.

Additional citations: VENEZUELA: Zulia: Bunting, Sanchez, & Alfonzo G. 7342 (Ld). BRAZIL: Amapá: Rabelo 355 (N). Maranhão: Jangoux & Bahia 554 (N). Pará: Davidson & Martinelli CD.10636 (N); Lobo, Vilhena, & Ribeiro 153 (N); Plowman, Davidse, Rosa, Rosário, & Santos 9444 (Ld, N).

AEGIPHILA RACEMOSA var. **CORDATIFOLIA** Mold.

Additional bibliography: Mold., *Phytol. Mem.* 2: 131 & 522. 1980; Mold., *Phytologia* 47: 49. 1980.

Additional citations: PERU: Loreto: Croat 20738 (Ld--photo of type).

AEGIPHILA RETICULATA Mold.

Additional bibliography: Mold., *Phytologia* 47: 49. 1980; Mold.,

Phytol. Mem. 2: 106 & 522. 1980.

AEGIPHILA RIEDELIANA Schau.

Additional bibliography: Walp., Repert. Bot. Syst. 4: 124. 1845; Klein, Sellowia 31: 163. 1979; Mold., Phytol. Mem. 2: 138 & 522. 1980; Mold., Phytologia 47: 49. 1980.

AEGIPHILA RIMBACHII Mold.

Additional bibliography: Mold., Phytologia 47: 49. 1980; Mold., Phytol. Mem. 2: 127 & 522. 1980.

AEGIPHILA RORAIMENSIS Mold.

Additional bibliography: Mold., Phytologia 47: 49. 1980; Mold., Phytol. Mem. 2: 113, 121, & 522. 1980.

AEGIPHILA SALTENSIS Legname

Additional bibliography: Mold., Phytol. Mem. 2: 173, 184, & 522. 1980; Mold., Phytologia 47: 49 (1980) and 50: 249. 1982.

Montes has found this plant growing at 180 m. altitude, in both flower and fruit in August, and records the vernacular name, "oreja de venado". He reports that the corollas were "yellow" and the fruit "cream-yellowish".

Material of this taxon has been misidentified and distributed in some herbaria as *Cestrum* sp. and as *Labiatae* sp.

Additional citations: ARGENTINA: Misiones: Montes 14784 (Au--27041).

AEGIPHILA SALTICOLA Mold.

Additional bibliography: Mold., Phytologia 40: 393. 1978; Mold., Phytol. Mem. 2: 138, 172, & 522. 1980.

AEGIPHILA SCANDENS Mold.

Additional bibliography: Mold., Phytol. Mem. 2: 138 & 522. 1980; Mold., Phytologia 47: 49. 1980.

The *Aegiphila scandens* of Anderson seems to be a synonym of *A. macrantha* Ducke.

AEGIPHILA SCHIMPFII Mold.

Additional bibliography: Mold., Phytol. Mem. 2: 127 & 522. 1980; Mold., Phytologia 47: 50 (1980) and 50: 246. 1982.

Escobar describes this plant as a weak shrub, its long branches supported by surrounding shrubs, the fruit orange in color in April.

Additional citations: ECUADOR: El Oro: Escobar 1177 (Ld).

AEGIPHILA SELLOWIANA Cham.

Additional & emended bibliography: Cham., Linnaea 7: 111--112. 1832; Walp., Repert. Bot. Syst. 4: 121. 1845; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 166. 1895; Mold., Phytol. Mem. 2: 127, 138, 173, 344, 372, & 522. 1980; Mold., Phytologia 47: 136 (1980) and 50: 247. 1982.

Recent collectors describe this plant as a tree, 7--8 m. tall,

the bark dark-gray, soft and white, the fruit oblong, orange to chestnut-color when mature. They have found it growing in "secondary forests with scattered large trees", in flower in January and February and in fruit in June. The corollas are said to have been "white" on Héringer & al. 3269, "light-yellow" on Héringer & al. 6031, and "yellowish-white" on Anderson 11948.

The Anderson 11796, distributed as A. sellowiana, actually represents the closely related A. lhotzkiana Cham.

Additional citations: FRENCH GUIANA: Oldeman B.3368 (Cy). BRAZIL: Amazonas: Vieira, Zarucchi, Silva, Mota, & Monteiro 88 (N). Bahia: Héringer, Figueiras, Mendonça, Pereira, Salles, & Silva 3269 (N, W--2927030); Mattos Silva & Hage 318 (N); Mori, Kallunki, & Pennington 9289 (N). Distrito Federal: Héringer, Figueiras, Mendonça, & Pereira 6031 (W--2900650), 6178 (W--2900649); Héringer, Paula, Mendonça, & Salles 1476 (N, W--2927033). Mato Grosso: Hatschbach 25007 (Ba). Minas Gerais: Ramalho 702 [Herb. Esc. Sup. Florest. 573] (Ba), 714 [Herb. Esc. Sup. Florest. 594] (Ba). BOLIVIA: El Beni: W. R. Anderson 11948 (W--2934473).

AEGIPHILA SETIFORMIS Rusby

Additional bibliography: Mold., *Phytologia* 27: 362. 1973; Mold., *Phytol. Mem.* 2: 173 & 522. 1980.

AEGIPHILA SKUTCHII Mold.

Additional bibliography: Mold., *Phytologia* 40: 395. 1978; Mold., *Phytol. Mem.* 2: 59, 70, 75, & 522. 1980.

AEGIPHILA SMITHII Mold.

Additional bibliography: Mold., *Phytol. Mem.* 2: 106, 131, & 522. 1980; Mold., *Phytologia* 47: 136 (1980) and 50: 246. 1982.

Recent collectors describe this plant as a shrub or small tree, 2--3 m. tall, with fragrant flowers and green [immature] fruit, turning yellow, and finally orange-color. They have encountered it in virgin forests, at 200 m. altitude, flowering in April and in fruit in September. The corollas are described as having been a "brilliant yellow (5Y 9/9)".

Additional citations: PERU: Amazonas: Huashikat 276 (Ld), 638 (Ld). Loreto: Diaz & Jaramillo 1342 (Lc); Schunke Vigo 5852 (W--2653139).

AEGIPHILA SORDIDA Mold.

Additional bibliography: Mold., *Phytologia* 47: 396. 1978; Mold., *Phytol. Mem.* 2: 131 & 522. 1980.

AEGIPHILA SPICATA (Rusby) Mold.

Additional bibliography: Mold., *Phytologia* 47: 45 & 50--51. 1980; Mold., *Phytol. Mem.* 2: 131, 173, 383, & 522. 1980.

AEGIPHILA SPLENDENS Schau.

Additional & emended bibliography: Briq. in Engl. & Prantl, *Nat.*

Pflanzenfam., ed. 1, 4 (3a): 166. 1895; Mold., Phytologia 40: 396. 1978; Mold., Phytol. Mem. 2: 138 & 522. 1980.

AEGIPHILA SPRUCEANA Mold.

Additional bibliography: Mold., Phytologia 40: 396. 1978; Mold., Phytol. Mem. 2: 113, 138, 371, & 522. 1980.

AEGIPHILA STANDLEYI Mold.

Additional bibliography: Mold., Phytologia 27: 364—365. 1973; Mold., Phytol. Mem. 2: 70, 80, & 522. 1980.

AEGIPHILA STEINBACHII Mold.

Additional bibliography: Mold., Phytol. Mem. 2: 173 & 522. 1980; Mold., Phytologia 47: 51. 1980.

AEGIPHILA STEYERMARKII Mold.

Additional bibliography: Mold., Phytologia 40: 396—397 & 400. 1978; Mold., Phytol. Mem. 2: 113, 371, & 522. 1980.

AEGIPHILA STEYERMARKII var. *MACROPHYLLA* Mold.

Additional bibliography: Mold., Phytologia 40: 397 & 400. 1978; Mold., Phytol. Mem. 2: 113, 371, & 522. 1980.

AEGIPHILA STEYERMARKII var. *OBTUSIFOLIA* Mold.

Additional bibliography: Mold., Phytologia 40: 397. 1978; Mold., Phytol. Mem. 2: 113 & 522. 1980.

AEGIPHILA SUFFLAVA Mold.

Additional bibliography: Mold., Phytol. Mem. 2: 106, 127, 131, & 522. 1980; Mold., Phytologia 47: 51. 1980.

Recent collectors describe the fruit of this species as red (in May) and found it growing at 120 m. altitude.

Additional citations: PERU: Loreto: Diaz, Osores, & Jaramillo 31 (Ld).

AEGIPHILA SUFFLAVA var. *KLUGII* Mold.

Additional bibliography: Mold., Phytologia 40: 397. 1978; Mold., Phytol. Mem. 2: 131 & 522. 1980.

AEGIPHILA SWARTZIANA Urb.

Additional bibliography: Mold., Phytologia 27: 366. 1973; Mold., Phytol. Mem. 2: 92 & 522. 1980.

AEGIPHILA SYLVATICA Mold.

Additional bibliography: Mold., Phytol. Mem. 2: 106 & 522. 1980; Mold., Phytologia 47: 51. 1980.

AEGIPHILA TERNIFOLIA (H.B.K.) Mold.

Additional bibliography: Bocq. in Baill., Rec. Obs. Bot. 3: 187 & 188. 1863; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 166. 1895; Mold., Phytol. Mem. 2: 106, 113, 114, 372, 373,

376, 399, 422, & 522. 1980; Mold., Phytologia 47: 51. 1980.

AEGIPHILA TERNIFOLIA f. OPPOSITIFOLIA López-Palacios

Additional bibliography: Mold., Phytologia 47: 51. 1980; Mold., Phytol. Mem. 2: 106, 114, 372, 376, 422, & 522. 1980.

Killip & Smith describe this plant as a tree, 15--20 m. tall, and found it growing on scrubby slopes, at 2000--2600 m. altitude.

Additional citations: COLOMBIA: Santander: Killip & Smith 19295 (N).

AEGIPHILA TRIFIDA Sw.

Additional & emended bibliography: J. F. Gmel. in L., Syst. Veg., ed. 13, imp. 2, 2: 259. 1791; G. Don in Sweet, Hort. Brit., ed. 3, 550. 1838; Walp., Repert. Bot. Syst. 4: 120. 1845; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 166. 1895; Mold., Phytologia 40: 398--399. 1978; Mold., Phytol. Mem. 2: 92, 341, & 522. 1980.

AEGIPHILA UMBRACULIFORMIS Mold.

Additional bibliography: Mold., Phytologia 40: 399. 1978; Mold., Phytol. Mem. 2: 131 & 522. 1980.

AEGIPHILA UNIFLORA Urb.

Additional bibliography: Mold., Phytologia 27: 371. 1973; Mold., Phytol. Mem. 2: 82 & 522. 1980.

AEGIPHILA VALERII Standl.

Additional bibliography: Mold., Phytologia 40: 399. 1978; Mold., Phytol. Mem. 2: 59, 80, & 522. 1980.

AEGIPHILA VALLENSIS Mold.

Additional bibliography: Mold., Phytol. Mem. 2: 106 & 522. 1980; Mold., Phytologia 47: 51. 1980.

AEGIPHILA VELUTINOSA Mold.

Additional bibliography: Mold., Phytologia 47: 136. 1980; Mold., Phytol. Mem. 2: 131 & 522. 1980.

AEGIPHILA VENEZUELENSIS Mold.

Additional bibliography: Mold., Phytol. Mem. 2: 114 & 522. 1980; Mold., Phytologia 47: 136. 1980.

Recent collectors describe this species as a tree, 10 m. tall, the fruit orange-yellow (in January).

Additional citations: VENEZUELA: Bolívar: Steyermark, Maguire, Brewer-Carías, Maguire, & Espinosa 124020 (N).

AEGIPHILA VENEZUELENSIS var. **SERRATA** Mold.

Additional bibliography: Mold., Phytologia 47: 136. 1980; Mold., Phytol. Mem. 2: 114 & 522. 1980.

AEGIPHILA VERTICILLATA Vell.

Additional bibliography: Cham., Linnaea 7: 110--111. 1832;

Mold., *Phytologia* 47: 136. 1980; Mold., *Phytol. Mem.* 2: 138, 176, 372, & 522. 1980.

AEGIPHILA VILLOSA (Aubl.) Gmel.

Additional & emended bibliography: J. F. Gmel. in L., *Syst. Veg.*, ed. 13, imp. 2, 2: 259. 1791; Walp., *Repert. Bot. Syst.* 4: 121. 1845; Bocq. in Baill., *Adansonia*, ser. 1 [Rec. Obs. Bot.] 3: 190. 1863; Briq. in Engl. & Prantl, *Nat. Pflanzenfam.*, ed. 1, 4 (3a): 166. 1895; Mold., *Phytologia* 47: 136--137. 1980; Mold., *Phytol. Mem.* 2: 121, 125, 138, & 522. 1980.

Recent collectors describe this plant as a small tree, 3--5 m. tall, or shrub, 2.5--3 m. tall, very yellowish-villous throughout, the branches contorted, the branchlets tetragonal, the wood white or yellow, very soft, the bark green or cream-color to dark-gray, the leaves opposite or subopposite, light-green, to 50 cm. long, basally attenuate, with very prominent venation on the lower surface, all parts covered with a white or beige tomentum, and the fruit greenish-yellow to yellow. They have found it growing in secondary vegetation and along roadsides, as well as among talus vegetation.

The corollas are said to have been "white" on Oldeman B.3967 and "very pale-yellow" on Oldeman T.810. Prévost reports the corollas 15--18 mm. long when fresh. He also describes the plant as a "petit arbre dressé à axes orthotropes". Granville notes: "jeunes rameaux soyeux, feuilles et inflorescences soyeuses aussi, recouvertes d'une fine pilosité blanche". Oldeman also says "avec des poils blancs" and reports the vernacular names, "bois calou", "cassava-oudou", and "taki-taki"; a photograph of the plant in situ accompanies his no. 2084.

The plant has been collected recently in anthesis in February, April, and June and in fruit in June.

Additional citations: FRENCH GUIANA: Cremers 5782 (Ld); Granville 163 (Cy, Cy), B.5178 (Ld); Grenand 1907 (Cy); Herb. Serv. Forest. Cayenne 69 (P); Oldeman 2084 (Cy, Cy, Cy), B.3967 (Cy, Cy), B.4290 (Cy, Cy), T.810 (Cy); Prévost 508 (Ld); Prévost & Grenand 1969 (Ld).

AEGIPHILA VITELLINIFLORA Klotzsch

Additional & emended bibliography: Bocq. in Baill., *Adansonia*, ser. 1 [Rec. Obs. Bot.] 3: 190. 1863; Mold., *Phytologia* 47: 137. 1980; Mold., *Phytol. Mem.* 2: 138, 173, 176, 344, 372, & 522. 1980.

Recent collectors describe this plant as a shrub, 2 m. tall, with yellow fruit, and have found it growing in semi-shade, in fruit in April, reporting the vernacular name, "café do mato".

It is very probable that A. lanceolata Mold. is merely a variety or form of this species.

Additional citations: BRAZIL: Rio de Janeiro: Araujo & Maciel 3668 [Herb. FEEMA 16591] (Ld). Rondônia: Vieira, Zarucchi, Petersen, Ramos, & Mota 694 (Mi, N).

AEGIPHILA VITELLINIFLORA var. **EGLERI** Mold.

Additional bibliography: Mold., *Phytologia* 27: 376. 1973; Mold., *Phytol. Mem.* 2: 138 & 522. 1980.

AEGIPHILA WIGANDIOIDES Lundell

Additional bibliography: Mold., *Phytol. Mem.* 2: 59 & 522. 1980; Mold., *Phytologia* 47: 137. 1980.

ADDITIONAL NOTES ON THE GENUS BOUCHEA. VII

Harold N. Moldenke

The last previous installment of these notes was published in *Phytologia* 40: 413--423 (1978). For a detailed explanation of the herbarium acronyms used in this and all others in my series of papers, see *Phytologia Memoirs* 2: 463--469 (1980) with supplement in *Phytologia* 50: 268 (1982).

BOUCHEA Cham.

Additional & emended bibliography: Sandmark in L., *Amoen. Acad.* 5: 375. 1759; J. F. Gmel. in L., *Syst. Nat.*, ed. 13, imp. 2, 2: 41. 1791; Meisn., *Pl. Vasc. Gen.* 2: 198. 1840; Reichenb., *Deutsch. Bot. [Repert. Herb. Nom.]* 108. 1841; D. Dietr., *Syn. Pl.* 3: 370, 596, & 605. 1843; Lindl., *Veget. Kingd.* 664. 1846; A. L. Juss. in Orbigny, *Dict. Univ. Hist. Nat.* 13: 185. 1849; Wight, *Icon. Pl. Orient.* 4 (3): 10--11, pl. 1461 & 1462. 1849; C. Muell. in Walp., *Ann. Bot. Syst.* 5: 706. 1860; Bocq. in Baill., *Adansonia*, ser. 1 [Rec. Obs. Bot.] 2: 89, 110, 115, 124, 125, 127, 128, 132, 134, 143, & 146--148 (1862) and 3: 180--182, 184, 185, 235--237, & 241, pl. 16. 1863; Lindl., *Treas. Bot.*, imp. 1, 1: 160. 1870; Pfeiffer, *Nom. Bot.* 2 (1): 133 & 759. 1874; Lindl., *Treas. Bot.*, imp. 2, 1: 160 (1876) and imp. 3, 1: 160. 1884; A. Gray, *Synop. Fl. N. Am.*, ed. 2, 2: 333--335. 1886; Durand, *Ind. Gen. Phan.* 320. 1888; Baill., *Hist. Pl.* 11: 94 & 102 (1891) and 11: 488. 1892; Briq. in Engl. & Prantl, *Nat. Pflanzenfam.*, ed. 1, 4 (3a): 133, 135, 137, 140, 142--144, 149, & 153--154, fig. 59 A & B. 1895; Gürke in Engl., *Pflanzenw. Ost-Afr. C.* 338. 1895; Briq. in Engl. & Prantl, *Nat. Pflanzenfam.*, ed. 1, 4 (3a): [381]. 1897; Lindl., *Treas. Bot.*, imp. 4, 1: 160. 1899; Millsp., *Field Columb. Mus. Publ. Bot.* 1: 523. 1902; Post & Kuntze, *Lexicon* 76 & 167. 1904; Reiche, *Estud. Crit. Fl. Chile* 5: 304. 1907; J. C. Willis, *Dict. Flow. Pl.*, ed. 3, 272. 1908; Urb., *Symb. Antil.* 4: 532--533. 1911; Fedde & Schust., *Justs Bot. Jahresber.* 39 (2): 319. 1913; Thonner, *Flow. Pl. Afr.* 468. 1915; Fedde, *Justs Bot. Jahresber.* 39 (2): 1324. 1916; Sanzin, *Anal. Soc. Cient. Argent.* 88: 106 & 133. 1919; J. C. Willis, *Dict. Flow. Pl.*, ed. 5, 90. 1925; J. Hutchins., *Fam. Flow. Pl.*, ed. 1, 1: 309 & 315. 1926;

Kobuski, Ann. Mo. Bot. Gard. 13: 16 & 23. 1926; Knuth, Feddes Repert. Spec. Nov. Beih. 43: [Init. Fl. Venez.] 603. 1927; Chiov., Fl. Somalia 56, 60, & 274. 1929; Ekman, Arkiv Bot. Stockh. 22A: 51. 1929; A. W. Hill, Ind. Kew. Suppl. 7: 260. 1929; Levyns, Guide Fl. Cape Penins. 216. 1929; Good & Exell, Journ. Bot. 68: Suppl. 140. 1930; Pio Corrêa & Pena, Dicc. Pl. Uteis Bras. 3: 394 & 395. 1931; Marloth, Fl. S. Afr. 3: 146. 1932; A. Chev., Rev. Bot. Appl. Agric. Trop. 15: 913. 1935; Mold., Suppl. List Comm. Vern. Names 1 & 15. 1940; Worsdell, Ind. Lond. Suppl. 1: 132. 1941; Lemée, Dict. Descrip. Syn. Gen. Pl. Phan. 8b: 653. 1943; Erdtman, Svensk Bot. Tidsk. 39: 281—284. 1945; H. N. & A. L. Mold., Fl. Life 2: 20, 22—24, 28, 30, 33, 51, 56—58, 62, 67, 74, 80, 81, 83, 89, & 94. 1948; Kidd, Wild Fl. S. Cape Penins. viii, pl. [40], fig. 6. 1950; Metcalfe & Chalk, Anat. Dicot. 2: 1031, 1032, & 1040. 1950; Lawrence, Taxon. Vasc. Pl., imp. 1, 687 & 782. 1951; J. C. Willis, Dict. Flow. Pl., ed. 6, 90. 1951; Alain in León & Alain, Fl. Cuba, imp. 1, 4: 279 & 294—295, fig. 127. 1957; Dalla Torre & Harms, Gen. Siphonog., imp. 2, 430. 1958; Rickett & Stafleu, Taxon 9: 84. 1960; Dalla Torre & Harms, Gen. Siphonog., imp. 3, 430. 1963; Erdtman, Journ. Indian Bot. Soc. 42A: 35—38. 1963; Jafri, Fl. Karachi 286, 287, & 352. 1966; Martin & Drew, Journ. Ariz. Acad. Sci. 6: 140—161. 1970; Rouleau, Guide Ind. Kew. 28 & 352. 1970; Lawrence, Taxon. Vasc. Pl., imp. 2, 687 & 782. 1971; Mukhopadhyay, Pollen Morph. Verb. [thesis]. 1971; Mukherjee, Trans. Bose Res. Inst. 35: 37—42. 1972; J. Hutchins., Fam. Flow. Pl., ed. 3, 487 & 917. 1973; D. Powell, Bull. Inst. Jam. Sci. 15 (2): 424. 1973; Thanikaimoni, Inst. Franç. Pond. Trav. Sect. Scient. Tech. 12 (2): 20. 1973; García-Barriga, Fl. Med. Colomb. 2: 497. 1975; Thanikaimoni, Inst. Franç. Pond. Trav. Sect. Scient. Tech. 13: 39, 328, & 359. 1976; Ozenda, Fl. Sahara, ed. 2, 407. 1977; Anon., Roy. Bot. Gard. Kew Lib. Curr. Awarren. 11: 21. 1978; Bhandari, Fl. Indian Des. 308—309. 1978; Fournet, Fl. Illustr. Phan. Guad. Mart. 1391 & 1419. 1978; Mold., Phytologia 40: 413—423, 480, 505, & 507. 1978; Mukherjee & Chanda, Trans. Bose Res. Inst. 41, 44, 47, 48, 54, & 57. 1978; Steyerma. & Huber, Fl. Avila 863, fig. 14a. 1978; Hocking, Excerpt. Bot. A.33: 90. 1979; Holm, Pancho, Herberger, & Plucknett, Geogr. Atlas World Weeds 51. 1979; Klein, Sellowia 31: 163. 1979; López-Palacios, Revist. Fac. Farm. Univ. Andes 20: 17. 1979; Milz & Rimpler, Zeitschr. Naturforsch. Wiesb. 34C: 324 & 325. 1979; Mold., Phytologia 44: 506. 1979; Rogerson, Becker, & Prince, Bull. Torrey Bot. Club 106: 62. 1979; Troncoso in Burkart, Fl. Illustr. Entre Rios 5: 230. 1979; J. T. & R. Kartesz, Syn. Checklist Vasc. Fl. 2: 466. 1980; Mold., Phytol. Mem. 2: 4, 25, 48, 54, 55, 59, 60, 70, 73, 75, 77, 78, 80, 85, 87, 93, 94, 97—101, 104, 107, 127, 132, 139, 173, 180, 185, 345, 375, 376, 396, 446, 448, 453, 463, & 524. 1980; Mold., Phytologia 45: 40, 352, & 504 (1980), 47: 456, 458, 459, & 503 (1981), 48: 451, 452, & 506 (1981), 50: 240, 243, 244, 257, & 504 (1982), and 52: 116 & 117. 1982.

The genus *Bouchea* is classified in the *Boraginaceae* by Rickett & Stafleu (1960), apparently as the result of a typographic or

editorial error.

The Graham & Johnston 4415, distributed as Bouchea sp., actually is Ghinia curassavica f. parvifolia Mold.

BOUCHEA AGRESTIS Schau.

Additional bibliography: Mold., Phytologia 40: 415. 1978; Hocking, Excerpt. Bot. A.33: 90. 1979; Mold., Phytol. Mem. 2: 139 & 524. 1980.

BOUCHEA BOLIVIANA (Kuntze) Mold.

Additional bibliography: Mold., Phytologia 40: 415. 1978; Mold., Phytol. Mem. 2: 173, 185, 375, 376, & 524. 1980.

Beck refers to this plant as a common herb, 1.2 m. tall, on riverbanks, at 400 m. altitude, and states that the corollas are "blue".

Additional citations: BOLIVIA: Santa Cruz: S. G. Beck 6617 (Ld).

BOUCHEA BOYACANA Mold.

Synonymy: Buchea boyacana Mold. ex López-Palacios, Revist. Fac. Farm. Univ. Andes 20: 17, sphalm. 1979.

Additional bibliography: Mold., Phytologia 40: 415 & 419. 1978; López-Palacios, Revist. Fac. Farm. Univ. Andes 20: 17. 1979; Mold., Phytol. Mem. 2: 107, 132, 376, & 524. 1980.

BOUCHEA BOYACANA var. **GLABRATA** Mold.

Additional bibliography: Mold., Phytologia 40: 415 & 419. 1978; Mold., Phytol. Mem. 2: 132 & 524. 1980.

BOUCHEA CHASCANOIDES Mold.

Additional bibliography: Mold., Phytologia 29: 44. 1974; Mold., Phytol. Mem. 2: 139 & 524. 1980.

Hatschbach & Kasper describe this plant as a shrub, 1.5 m. tall, with "blue" corollas, and found it growing in "encosta rochosa de morro", flowering in October.

Additional citations: BRAZIL: Minas Gerais: Hatschbach & Kasper 41633 (Ld).

BOUCHEA CIPOËNSIS Mold.

Additional bibliography: Mold., Phytologia 29: 44. 1974; Mold., Phytol. Mem. 2: 139 & 524. 1980.

BOUCHEA DISSECTA S. Wats.

Additional bibliography: H. N. & A. L. Mold., Pl. Life 2: 74. 1948; Mold., Phytologia 40: 415. 1978; Mold., Phytol. Mem. 2: 59, 375, & 524. 1980; Mold., Phytologia 50: 240. 1982.

Recent collectors describe this plant as an erect, tall herb, 30—80 cm. tall, and have found it growing in secondary vegetation, in soil from metamorphic rocks (mármol), and abundant in sandy clay soil with matorral vegetation of the low, spiny, deciduous type, along with Stenocereus quevedonis, at 100—400 m. altitude, flowering and fruiting in September and October. The corollas are said

to have been "purple" on Soto Núñez 1074 and Soto Núñez & al. 1141 & 1642 and "lilac" on Delgado & al. 77. The Soto Núñez & Ramírez S. 1642 collection, cited below, exhibits leaves which in some cases have only a very few large lobes.

Additional citations: MEXICO: Jalisco: Delgado, Hernández, & Trejo 77 (Me--200550). Michoacán: Soto Núñez 1074 (Me--290292); Soto Núñez & Ramos 1141 (Me--284134); Soto Núñez & Ramírez S. 1642 (Me--289868).

BOUCHEA FLABELLIFORMIS M. E. Jones

Additional bibliography: Mold., Phytologia 29: 45. 1974; Mold., Phytol. Mem. 2: 60 & 524. 1980.

BOUCHEA FLUMINENSIS (Vell.) Mold.

Additional synonymy: Buchea fluminensis Vell. ex López-Palacios, Revist. Fac. Farm. Univ. Andes 20: 17, sphalm. 1979.

Additional & emended bibliography: D. Dietr., Syn. Pl. 3: 596. 1843; Walp., Repert. Bot. Syst. 4: 11--12 & 34. 1845; Bocq. in Baill., Adansonia, ser. 1 [Rec. Obs. Bot.] 3: 237. 1863; Bocq., Rev. Verbenac. 237. 1863; Baill., Hist. Pl. 11: 94. 1891; Eriq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 143. 1895; Herzog, Meded. Rijks Herb. Leid. 29: 46. 1916; Grenz., Ann. Mo. Bot. Gard. 13: 85, pl. 11 & 12. 1926; Pío Corrêa & Pena, Dicc. Pl. Uteis Bras. 3: 395. 1931; Mold., Phytologia 40: 415--416. 1978; Mukherjee & Chanda, Trans. Bose Res. Inst. 41: 47. 1978; Klein, Sellowia 31: 163. 1979; López-Palacios, Revist. Fac. Farm. Univ. Andes 20: 17. 1979; Mold., Phytol. Mem. 2: 127, 132, 139, 173, 180, 185, 345, 376, & 524. 1980.

Additional illustrations: Grenz., Ann. Mo. Bot. Gard. 13: pl. 11 & 12. 1926.

Pío Corrêa & Pena (1931) say of this plant: "Reputada anti-emética e estimulante do aparelho digestivo", giving its natural distribution as "Amazonas e desde a Bahia até S. Paulo e Minas Gerais, talvez em todo o Brasil". He avers that in São Paulo it is called "gervão de folha grande", while in Minas Gerais it is known as "gervão de folha larga". He seems to recommend the name, "gervão falso".

Erdtman (1945) reports that in B. fluminensis, as well as in B. prismatica (L.) Kuntze and B. rusbyi Mold., the pollen grains are "usually triporate and of a rather strange appearance" -- this is in contradistinction to the tricolporate grains in Chascanum and the tetra- or pentacolpate grains in B. linifolia A. Gray. He suggests that the genus Bouchea should, perhaps, be divided into 2 sections, the one with colpate grains (as in B. linifolia or probably also the related B. spatulata Torr.), and the other with porate grains. "Pollenmorphologically this would form some sort of a parallel to the two sections of Morina mentioned in Erdtman 1945."

Recent collectors refer to this plant as an herb, less than a meter tall, and have found it growing in more or less open campo

with secondary vegetation, in clay soil at the edge of pastures, in cacao plantations, and in matorral, at 350—800 m. altitude, flowering from February to April as well as in November and December. Other collectors refer to it as herb, 0.4—1 m. tall, perennial.

The corollas are said to have been "blue" on Gentry 10063, Pinheiro & Santos 2283, and Rimachi Y. 4129, "rose with a white center" on Santos 2051, "pale purplish-mauve, white in the throat" on Renvoize 3485, "dark-blue" on Beck 7494, and "violet" on Steinbach 789.

The Eggers 14618 specimen in the United States National Herbarium is not B. fluminensis, as are duplicates of this number elsewhere, but is Stachytarpheta cayennensis (L. C. Rich.) Vahl, so the number seems to represent a mixture.

Additional citations: ECUADOR: Guayas: Gentry 10063 (Go). PERU: Madre de Dios: Vargas C. 18826 (W—2702696). San Martín: Rimachi Y. 4129 (N). BRAZIL: Espirito Santo: Pinheiro & Santos 2283 (W—2849207); T. S. Santos 2051 (W—2849210). BOLIVIA: La Paz: S. G. Beck 7494 (Ld). Santa Cruz: R. F. Steinbach 789 (Lb—64883). ARGENTINA: Jujuy: Renvoize 3485 (N, W—2894517). Misiones: Krapovickas, Cristóbal, & Maruffak 15732 (Ws, Ws).

BOUCHEA FLUMINENSIS f. ALBIFLORA Mold.

Additional bibliography: Mold., Phytologia 29: 48—49. 1974; Mold., Phytol. Mem. 2: 139 & 524. 1980.

BOUCHEA FLUMINENSIS var. PILOSA Mold.

Additional bibliography: Mold., Phytologia 40: 416. 1978; Mold., Phytol. Mem. 2: 139, 185, 376, & 524. 1980.

BOUCHEA INOPINATA Mold.

Additional bibliography: Mold., Phytologia 40: 416. 1978; Mold., Phytol. Mem. 2: 139, 376, & 524. 1980.

BOUCHEA LINIFOLIA A. Gray

Additional bibliography: Mold., Phytologia 40: 416—417. 1978; J. T. & R. Kartesz, Syn. Checklist Vasc. Fl. 2: 466. 1980; Mold., Phytol. Mem. 2: 48, 54, 60, & 524. 1980.

Recent collectors describe this plant as a small perennial herb or woody-based subshrub and have found it growing in crevices in limestone arroyos with Quercus invaginata, Acacia berlandieri, Gochnatia, Helietta, Brahea, Condalia, Brickellia, etc. in a general area of Tamaulipan scrub, at 1100—1660 m. altitude, in flower in May, and in both flower and fruit in June and September.

The corollas are said to have been "lavender, lighter in the throat" on the Wendt & Riskind collection, cited below, and "bright-reddish" on the Gentry & Engard collection. The two latter collectors encountered it on sunny rocky slopes, while Stew-

art refers to it as a common shrub on dry rocky hillsides.

Erdtman (1945) describes the pollen grains of B. linifolia as tetra- or pentacolpate and suggests that this species, and probably the related B. spathulata Torr., should perhaps constitute a separate subsection or section in the genus.

Additional citations: TEXAS: Pecos Co.: Correll & Hanson 29885 (M1). Val Verde Co.: Rowell 15274 (Me--128181). MEXICO: Coahuila: Gentry & Engard 23233 (Me--163875); Could 10605 (M1); R. M. Stewart 645 (Me--203734); Wendt & Riskind 1726 (Au, Me--263229).

BOUCHEA NELSONII Grenz.

Additional & emended bibliography: Grenz., Ann. Mo. Bot. Gard. 13: 83--84, pl. 10 & 12. 1926; Worsdell, Ind. Lond. Suppl. 1: 132. 1941; H. N. & A. L. Mold., Pl. Life 2: 74. 1948; Mold., Phytologia 40: 417. 1978; Mold., Phytol. Mem. 2: 60, 70, 75, 78, 80, 345, & 524. 1980; Mold., Phytologia 50: 243 (1982) and 52: 117. 1982.

Additional illustrations: Grenz., Ann. Mo. Bot. Gard. 13: pl. 10 & 12. 1926.

Recent collectors have found this plant growing along open roadsides, in low grazed deciduous forests, gravelly soil in Acacia thorn forests, and on steep slopes with tropical deciduous forest in ravines, at 80--830 m. altitude, in both flower and fruit from August to October. They describe it as an herb, 30 cm. tall, the leaves gray-green beneath, and the 4 fertile stamens with yellow anthers. Webster and his associates report it a common roadside weed in Oaxaca, while Stevens refers to it as "uncommon along roadsides on floodplain" in Nicaragua. Matuda 164 & 6119 exhibit especially large leaves.

The corollas are described as having been "lavender" on Breedlove 42288, "purple" on Breedlove & Thorne 20872, "pale-purple" on D'Arcy 12033, "lavender-pink" on Breedlove 28276, "purple, throat white but red above" on Rohweder 3362, and "lobes pink, tube white" on Clausen & Cervantes G. 6125, while on Stevens 3030 the corolla is said to have been "purple with a white center". On Zizumbo & Colunga 188 it is also described as "purple" and on Stevens 9980 "pale-purple".

The additional vernacular name, "xepepiend", is reported from Oaxaca.

Material of B. nelsonii has been misidentified and distributed in some herbaria as B. prismatica (L.) Kuntze, "B. prismatica (Jacq.) Kuntze", B. prismatica var. longirostra Grenz., Stachytarpheta sp., and Labiatae sp.

Additional citations: MEXICO: Chiapas: Breedlove 28276 (Me--228588), 42288 (Me--24425); Breedlove & Thorne 20872 (Me--200017); Clausen & Cervantes G. 6125 (It, Me--214886, N); Matuda 16922 (Me--81718). Guerrero: Boege 1916 (Me--96089). Oaxaca: D'Arcy 12033 (Ld); Hernández M. 50a (Me--137745); Matuda 164 (Me--81686),

6119 (Me—81687); Pennell, Dunn, & Dziekanowski 370 (Me—258735); Webster, Miller, & Miller 13000 (Me—133600); Zizumbo & Colunga 188 (Me—268234). NICARAGUA: Estelí: W. D. Stevens 9980 (Ld). Matagalpa: W. D. Stevens 9828 (Ld). Nueva Segovia: W. D. Stevens 3030 (Ld). EL SALVADOR: La Libertad: Rohweder 3362 (E—2681486).

BOUCHEA NOTABILIS Mold.

Synonymy: Buchea notabilis Mold. ex López-Palacios, Revist. Fac. Farm. Univ. Andes 20: 17. 1979.

Additional bibliography: Mold., Phytologia 29: 51. 1974; López-Palacios, Revist. Fac. Farm. Univ. Andes 20: 17. 1979; Mold., Phytol. Mem. 2: 107, 376, & 524. 1980.

BOUCHEA PRISMATICA (L.) Kuntze

Additional & emended synonymy: Bouchea prismatica var. prismatica [(L.) Kuntze] apud Alain in León & Alain, Fl. Cuba, imp. 1, 4: 294. 1957. Bouchea prismatica var. prismatica Alain apud Mold., Fifth Summ. 1: 400, in syn. 1971. Buchia prismatica (L.) Kuntze ex López-Palacios, Revist. Fac. Farm. Univ. Andes 20: 17. 1979. Bouchea enbergii Cham. ex Holm, Pancho, Herberger, & Plucknett, Geogr. Atlas World Weeds 51, sphalm. 1979.

Additional & emended bibliography: Sandmark in L., Amoen. Acad. 5: 375. 1759; J. F. Gmel. in L., Syst. Nat., ed. 13, imp. 2, 2: 41. 1791; Lam., Tabl. Encycl. Méth. Bot. 1: 59. 1791; Spach, Vég. Phan. 9: 227. 1840; Endl., Enchirid. Bot. 312. 1841; Reichenb., Deutsch. Bot. [Repert. Herb. Nom.] 108. 1841; D. Dietr., Syn. Pl. 3: 596. 1843; Walp., Repert. Bot. Syst. 4: 11—12 & 34. 1845; Lindl., Veg. Kingd. 664. 1847; Bocq. in Baill., Adansonia, ser. 1 [Rec. Obs. Bot.] 3: 237. 1863; Millsp., Field Columb. Mus. Publ. Bot. 1: 523. 1902; Urb., Symb. Antill. 4: 532—533. 1911; Grenz., Ann. Mo. Bot. Gard. 13: 78—80 & 90, pl. 9 & 12. 1926; Knuth, Feddes Repert. Spec. Nov. Beih. 43: [Init. Fl. Venez.] 603. 1927; Ekman, Arkiv Bot. Stockh. 22A: 51. 1929; Mold., Suppl. List Comm. Vern. Names 14. 1940; Worsdell, Ind. Lond. Suppl. 1: 132. 1941; H. N. & A. L. Mold., Pl. Life 2: 33, 57, & 58. 1948; Alain in León & Alain, Fl. Cuba, imp. 1, 4: 294—295, fig. 127. 1957; D. Powell, Bull. Inst. Jam. Sci. 15 (2): 424. 1973; García Barriga, Fl. Med. Colomb. 2: 497. 1975; Fournet, Fl. Illust. Phan. Guad. Mart. 1419. 1978; Mold., Phytologia 40: 417—421. 1978; Mukherjee & Chanda, Trans. Bose Res. Inst. 41: 47. 1978; Steyererm. & Huber, Fl. Avila 863 & 864, fig. 14a. 1978; Holm, Pancho, Herberger, & Plucknett, Geogr. Atlas World Weeds 51. 1979; López-Palacios, Revist. Fac. Farm. Univ. Andes 20: 17. 1979; Mold., Phytologia 44: 102. 1979; J. T. & R. Kartesz, Syn. Checklist Vasc. Fl. 2: 466. 1980; Mold., Phytol. Mem. 2: 25, 48, 55, 60, 70, 73, 75, 77, 78, 85, 87, 93, 94, 97—101, 104, 107, 114, 127, 139, 345, 376, 396, 446, 448, 453, 463, & 524. 1980; Mold., Phytologia 47: 458 (1981), 50: 240, 244, & 257 (1982), and 52: 116. 1982.

Emended illustrations: Alain in León & Alain, Fl. Cuba, imp. 1, 4: 294, fig. 127. 1957.

Recent collectors describe this plant as a "weed" and have found it growing in waste places, in loose rocky soil on hill-sides, in sedimentary rock creekbeds, and on slopes with Croton, Heliocarpus, and Erythrina, at 800—1150 m. altitude, in flower in April, June, August, and December, and in fruit in June and August. Ekman (1929) describes it as "a weed, not rare, throughout Haiti".

The corollas are said to have been "mauve" on Alston 5438, "purple" on Hernández & Mancías 1129, and "violet" on Molina R. 76.

Erdtman (1945) describes the pollen grains as triporate and "of a rather strange appearance", as they also are in B. fluminensis (Vell.) Mold. and B. rusbyi Mold., but as they are not in B. liniifolia A. Gray.

The type of B. ehrenbergii Cham., a synonym of the present taxon, was photographed in the Berlin herbarium by Macbride as his photograph number 17582.

Knuth (1927) cites from Venezuela the following collections: Federal District: Moritz 293, Otto 797, Pittier 7887 & 9729, Vargas s.n., Wagner 44. Miranda: Pittier 5830 & 5832. Margarita Island: Miller & Johnston 205. He makes the curious statement that B. prismatica is not based on Verbena prismatica L. and so "L." does not belong in the authority citation. This claim is erroneous.

Material of typical B. prismatica has been misidentified and distributed in some herbaria as its var. brevirostra Grenz. and even as "Stachytarphaeta" sp. and Verbena sp. On the other hand, the Breedlove & Thorne 20872, Boege 1916, Clausen & Cervantes G. 6125, Hernández M. 50a, Pennell, Dunn, & Dziekanowski 370, Webster, Miller, & Miller 13000, and Zizumbo & Colunga 188, distributed as B. prismatica, are all B. nelsonii Grenz., while Dziekanowski & al. 3392 is B. prismatica var. brevirostra Grenz.

Steyermark & Huber (1978), without justification, reduce B. prismatica var. brevirostra Grenz. to synonymy under typical B. prismatica. An examination of any series of specimens will show that the two taxa are distinct, provided the material is mature.

Additional citations: MEXICO: Chiapas: Ton 1385 (Mi). Morelos: Hunt 55 (Me—168651); A. N. Jackson 18 (Me—52962); Lyons 62 (Me—268153); Nye 8 (Me—52873). Oaxaca: Rowell, Webster, & Barkley 174488 (Me—175751). State undetermined: Ehrenberg 112 [Macbride photos 17582] (Mi—photo). HONDURAS: Morazán: Molina R. 76 (Me—81717), 27186 (Mi). Yoro: Hernández R. & Mancías 1129 (Ld). NICARAGUA: Department undetermined: Lévy s.n. (P). VENEZUELA: Carabobo: Mocquerys s.n. [Mariara] (P). Distrito Federal: Alston 5438 (W—2865582).

BOUCHEA PRISMATICA var. BREVIROSTRA Grenz.

Additional synonymy: Buchea prismatica var. brevirostra Grenz. ex López-Palacios, Revist. Fac. Farm. Univ. Andes 20: 17, sphalm.

1979.

Additional bibliography: Mold., Phytologia 40: 418—420. 1978; López-Palacios, Revist. Fac. Farm. Univ. Andes 20: 17. 1979; J. T. & R. Kartesz, Syn. Checklist Vasc. Fl. 2: 466. 1980; Mold., Phytol. Mem. 2: 48, 55, 60, 70, 77, 99—101, 104, 107, 114, 376, & 524. 1980; Mold., Phytologia 50: 244. 1982.

Recent collectors refer to this plant as erect, 30 cm. tall, and have found it growing on open rocky cliffs, in heavily grazed thorn-scrub pastures with orchids and bromeliads on bark of Cassia, Acacia, and Crescentia, on semi-xeric rocky hillsides, on dry open roadsides, in open chaparral, among Quercus emoryi, in cultivated soil with Convolvulus, Cuphea, and Oxalis, and in association with cacti, Ipomoea arborescens, Celtis, Acacia, Maurandia, and composites, from sealevel to 2100 m. altitude, in both flower and fruit from July to October. Kishler found it abundant in association with Sanvitalia procumbens and Ipomoea longifolia. Stuesset refers to it as "common" in Chihuahua.

The corollas are said to have been "blue" on Kishler 786 and Matuda 21869, "violet to pale-blue" on Argüelles 816, "lavender" on Breedlove 20012 & 27654, and "purple" on Hernández M. 3655, Liogier & al. 29362, and Stuessy 1006.

Material of this variety has been misidentified and distributed in some herbaria as var. longirostra Grenz. On the other hand, the Rowell, Webster, & Barkley 174188, distributed as and even previously cited by me as var. brevirostra, seems, instead, to be typical B. prismatica (L.) Kuntze.

Additional citations: MEXICO: Aguascalientes: Rzedowski 16193 (Me—75181). Chiapas: Breedlove 20012 (Me—227138), 26366 (Me—231860), 27654 (Me—227115). Chihuahua: LeSueur 136 (Me—50919); Stuessy 1006 (Me—136315). Distrito Federal: Lyonnet 317 (Me—239413, Me—239433), 667 (Me—239431); Sharp 44217 (Me). Durango: Xolocotzi, Rupert, & Guevara X. 2616 (Me—64810). Guanajuato: Barkley, Rowell, & Paxson 737 (Me—89307); Kishler 786 (Me—274936), 792 (Me—274937). Hidalgo: Hernández M. 2655 (Me—276501). Jalisco: Barkley, Webster, & Rowell 7642 (Me—173894); Harker & Mel-
lowes 29 (Me—117925); Templeton 12027 (Mi). México: Gold 283 (Me—199553); Guizar N. 596 (Me—284943); Matuda 19070 (Me—64814), 21703 (Me—55581, Me—64812), 21869 (Me—64813, Me—109170), 26654 (Me—78676); Matuda & al. 28967 (Me—78675), 29343 (Me—78611). Michoacán: Arsène 3040 (Me—185498). Morelos: Humphreys 102 (Me—108615); A. W. Jackson 18 (Me—178981); C. H. Thomas 93 (Me—182721). Puebla: Miranda 2046 (Me—73216). Querétaro: Argüelles 130 (Me—89211), 816 (Me—210634). San Luis Potosí: Rzedowski 3767 (Me—96603). Sonora: Turner, Dodge, & Mason 2061 (Me—47250); S. S. White s.n. [2—3 Sept. 1939] (Me—89352). GUATEMALA: Juti-
apa: Dziekanowski, Dunn, Trott, Thurm, Case, & Hess 3392 (N). PUERTO RICO: Liogier, Liogier, & Martorell 29362 (N). SOUTHERN

NETHERLANDS ANTILLES: Curaçao: Nagelkerken 127 (Ws). VENEZUELA: Aragua: Tamayo 4075 (N).

BOUCHEA PRISMATICA var. LACINIATA Grenz.

Additional bibliography: Mold., Phytologia 40: 420. 1978; Mold., Phytol. Mem. 2: 60 & 524. 1980; Mold., Phytologia 50: 240. 1982.

Matuda encountered this plant in low spiny matorral at 750 m. altitude.

Additional citations: MEXICO: México: Matuda & al. 31306 (Me—64818, Me—109193).

BOUCHEA PRISMATICA var. LONGIROSTRA Grenz.

Additional synonymy: Bouchea prismatica var. longirostra Grenz. ex López-Palacios, Revist. Fac. Farm. Univ. Andes 20: 17, sphalm. 1979. Bouchea prismatica var. longirostra Grezebak. ex Mold., Phytologia 50: 257, in syn. 1982. Bouchea prismatica var. longirostra Gresebach ex Mold., Phytologia 50: 257, in syn. 1982.

Bouchea prismatica var. longirostrata Greseb., in herb.

Additional & emended bibliography: Alain in León & Alain, Fl. Cuba, imp. 1, 4: 295. 1957; Mold., Phytologia 40: 420--421. 1978; Steyermark & Huber, Fl. Avila 864. 1978; López-Palacios, Revist. Fac. Farm. Univ. Andes 20: 17. 1979; J. T. & R. Kartesz, Syn. Checklist Vasc. Fl. 2: 466. 1980; Mold., Phytol. Mem. 2: 25, 60, 73, 75, 85, 87, 93, 94, 97, 104, 107, 114, 376, & 524. 1980; Mold., Phytologia 50: 240 & 257. 1982.

Vázquez encountered this plant between 1000 and 1100 m. altitude, in flower and fruit in August. The corollas are said to have been "pink" on Xolocotzi & Alexander 111.

Steyermark & Huber (1978) without justification reduce this taxon to synonymy under typical B. prismatica (L.) Kuntze. Examination of any large series of specimens with mature fruit will show that it is plainly distinct.

The Kishler 786 & 792 and White s.n. [2--3 Sept. 1939], distributed as var. longirostra, actually represent var. brevirostra Grenz., while Breedlove 42288 is B. nelsonii Grenz.

Additional citations: MEXICO: Guerrero: Webster, Rowell, & Barkley 17M718 (Me--175699); Xolocotzi & Alexander 111 (Me--64811). Morelos: Vázquez 3335 (Me--157809). Oaxaca: Miranda 4566 (Me--70407, Me--70408). San Luis Potosí: Alcorn 2073 (Au).

BOUCHEA PSEUDOHASCANUM (Walp.) Grenz.

Additional bibliography: C. Muell. in Walp., Ann. Bot. Syst. 5: 706. 1860; Pio Corrêa & Pena, Dicc. Pl. Utaís Bras. 3: 394. 1931; Mold., Phytologia 40: 421. 1978; Mold., Phytol. Mem. 2: 139, 345, 376, & 524. 1980.

Pio Corrêa (1931) says of this plant "Parece vegetar de preferência em terrenos arenosos" and gives its distribution as from Rio de Janeiro to São Paulo. He lists the vernacular names, "gervão bastardo" and "gervão falso".

BOUCHEA RUSBYI Mold.

Additional bibliography: H. N. & A. L. Mold., Pl. Life 2: 80. 1948; Mold., Phytologia 40: 421. 1978; Mold., Phytol. Mem. 2: 173 & 524. 1980.

Davidson encountered this plant among "somewhat disturbed vegetation on steep hillsides in the Holdridge life-zone which appears to be very moist subtropical rainforest grading into very moist lower montane rainforest, the latter especially over 4500—5000 feet elevation", in flower in November, and describes the "corolla-lobes" as "violet" in color. An in situ photograph accompanies his collection.

Erdtman (1945) reports that the pollen grains are "usually triporate and of a rather strange appearance", as are those of B. prismatica (L.) Kuntze and B. fluminensis (Vell.) Mold., but not those of B. linifolia A. Gray.

Additional citations: BOLIVIA: La Paz: Davidson 4869 (N).

BOUCHEA SPATHULATA Torr.

Additional bibliography: Mold., Phytologia 40: 421—423. 1978; Hocking, Excerpt. Bot. A.33: 90. 1979; J. T. & R. Kartesz, Syn. Checklist Vasc. Fl. 2: 466. 1980; Mold., Phytol. Mem. 2: 48, 60, & 524. 1980.

Erdtman (1945), while admitting that the pollen morphology of this species was at that time still unknown to him, suggests that it may belong in a separate section of the genus with B. linifolia A. Gray characterized by sessile leaves of the narrow sublinear type and pollen grains that are tetra- or pentacolpate, in distinction to a section comprising B. prismatica (L.) Kuntze, B. fluminensis (Vell.) Mold., B. rusbyi Mold., etc.

Stewart describes B. spathulata as common on hillsides in Coahuila, where it grows about 10--12 dm. tall, flowering in August with "lavender" corollas.

Additional citations: MEXICO: Coahuila: R. M. Stewart 1189 (Me--234457).

BOUCHEA SPATHULATA var. **LONGIFLORA** Mold.

Additional bibliography: Mold., Phytologia 40: 422—423. 1978; Hocking, Excerpt. Bot. A.33: 90. 1979; Mold., Phytol. Mem. 2: 60 & 524. 1980.

Recent collectors describe this plant as a common shrub, 1—3 feet tall, and have found it growing on gravelly-rocky limestone south-facing and lower bajada slopes covered by desert scrub of Acacia berlandieri, A. neovernicosa, Agave falcata, A. lecheguilla, Bouteloua spp., Bouvardia, Dasyllirion, Flourensia solitaria, Forestiera angustifolia, Fouquieria, Hechtia, Krameria grayi, Leucophyllum minus, Mascagnia cana, Parthenium argentatum, Platyopuntia, Rhus virens, Tiquilia, Viguiera stenoloba, and Yucca carnerosa, at 1550—1625 m. altitude, flowering in August. The corollas are said to have been "lavender" on both the collections cited

below.

Additional citations: MEXICO: Coahuila: Wendt & Lott 1407 (Au); Wendt, Lott, & Mispagel 1875 (Au, Me--259580).

ADDITIONAL NOTES ON THE GENUS CASSELIA. V

Harold N. Moldenke

The previous installment of my notes on this genus was published in *Phytologia* 40: 477--479 (1978). For a detailed explanation of the herbarium acronyms employed in this and all others in my long series of papers on verbenaceous and eriocaulaceous genera, see *Phytologia Memoirs* 2: 463--469 and *Phytologia* 50: 268. 1982.

CASSELIA Nees & Mart.

Additional bibliography: Cham., *Linnaea* 7: 364--366. 1832; Endl., *Gen. Pl.* 1: 634. 1838; Meisn., *Pl. Vasc. Gen.* 2: 199. 1840; Reichenb., *Deutsch. Bot. [Repert. Herb. Nom.]* 108. 1841; Brongn., *Enum. Gen. Pl.*, ed. 1, 65. 1843; D. Dietr., *Syn. Pl.* 3: 371, 605--606, & 618. 1843; Walp., *Repert. Bot. Syst.* 4: 39--40. 1845; Lindl., *Veg. Kingd.* 664. 1846; A. L. Juss. in *Orbigny, Dict. Univ. Hist. Nat.* 13: 184. 1849; Brongn., *Enum. Gen. Pl.*, ed. 2, 119. 1850; C. Muell. in *Walp., Ann. Bot. Syst.* 5: 705. 1860; Miers, *Trans. Linn. Soc. Lond. Bot.* 27: 102. 1871; Pfeiffer, *Nom. Bot.* 1 (2): 1855 (1874), 2 (1): 132 (1874), and 2 (2): 1593. 1874; Durand, *Ind. Gen. Phan.* 321. 1888; Baill., *Hist. Pl.* 11: 80 & 98. 1891; Briq. in *Engl. & Prantl, Nat. Pflanzenfam.*, ed. 1, 4 (3a): 139--142, 157, & 158, fig. G--J. 1895; S. Moore, *Trans. Linn. Soc. Lond. Bot.*, ser. 2, 4: 439 & 521. 1895; Briq. in *Engl. & Prantl, Nat. Pflanzenfam.*, ed. 1, 4 (3a): [381]. 1897; Post & Kuntze, *Lexicon* 103 & 688. 1904; D. H. Scott in *Solered., Syst. Anat. Dicot.* [transl. Boodle & Fritsch] 2: 1021. 1908; Nienburg, *Justs Bot. Jahresber.* 39 (2): 1051. 1916; J. C. Willis, *Dict. Flow. Pl.*, ed. 5, 124. 1925; Lemée, *Dict. Descrip. Syn. Gen. Pl. Phan.* 8B: 653. 1943; H. N. & A. L. Mold., *Pl. Life* 2: 22--24, 31, 53, 59, 61, 63, 73, & 83. 1948; Metcalfe & Chalk, *Anat. Dicot.* 2: 1031--1033 & 1040. 1950; Lawrence, *Tax. Vasc. Pl.*, imp. 1, 688. 1951; J. C. Willis, *Dict. Flow. Pl.*, ed. 6, 124. 1951; Dalla Torre & Harms, *Gen. Siphonog.*, imp. 2, 431. 1958; Rickett & Stafleu, *Taxon* 9: 84. 1960; Dalla Torre & Harms, *Gen. Siphonog.*, imp. 3, 431. 1963; Rouleau, *Guide Ind. Kew.* 37, 188, & 352. 1970; Lawrence, *Tax. Vasc. Pl.*, imp. 2, 688. 1971; Napp-Zinn, *Anat. Blatt. A* (1): 418. 1974; Mold., *Phytologia* 40: 477--479 & 506. 1978; Mukherjee & Chanda, *Trans. Bose Res. Inst.* 41: 40, 45, & 47. 1978; Hocking, *Excerpt. Bot. A*.33: 90. 1979; Rogerson, Becker, & Prince, *Bull. Torrey Bot. Club* 106: 62.

1979; Mold., Phytol. Mem. 2: 4, 139, 140, 173, 176, 347, 379, 445, & 529. 1980; Mold., Phytologia 45: 40 & 504 (1980) and 47: 411 & 504. 1981; Brenan, Ind. Kew. Suppl. 16: 58. 1981.

It is of at least passing interest that Reichenbach (1828) classified this genus in the Lamiaceae, while Rickett & Stafleu (1960) place it, apparently by editorial error, in the Boraginaceae.

CASSELIA CHAMAEDRYFOLIA Cham.

Additional synonymy: Casselia chamaedrifolia Cham. ex D. Dietr., Syn. Pl. 3: 605. 1843.

Additional bibliography: D. Dietr., Syn. Pl. 3: 605—606. 1843; Walp., Repert. Bot. Syst. 4: 40. 1845; Mold., Phytologia 40: 477. 1978; Mold., Phytol. Mem. 2: 139, 379, & 529. 1980.

CASSELIA CONFERTIFLORA (Mold.) Mold.

Additional bibliography: Mold., Phytologia 40: 477 & 478. 1978; Mold., Phytol. Mem. 2: 139, 445, & 529. 1980.

CASSELIA CONFERTIFLORA var. **LACINIATA** (Mold.) Mold.

Additional bibliography: Mold., Phytologia 40: 477. 1978; Mold., Phytol. Mem. 2: 139 & 529. 1980.

CASSELIA GLAZIOVII (Briq. & Mold.) Mold.

Additional bibliography: Mold., Phytologia 40: 477—479. 1978; Mold., Phytol. Mem. 2: 139 & 529. 1980; Brenan, Ind. Kew. Suppl. 16: 58. 1981.

CASSELIA GLAZIOVII var. **SERRATA** Mold.

Additional bibliography: Mold., Phytologia 40: 478 & 479. 1978; Mold., Phytol. Mem. 2: 139 & 529. 1980; Brenan, Ind. Kew. Suppl. 16: 58. 1981.

CASSELIA HASSLERI Briq.

Additional bibliography: H. N. & A. L. Mold., Pl. Life 2: 63. 1948; Mold., Phytologia 40: 478. 1978; Mold., Phytol. Mem. 2: 176 & 529. 1980.

CASSELIA HYMENOCLYX Briq.

Additional bibliography: Mold., Phytologia 40: 478. 1978; Mold., Phytol. Mem. 2: 176, 347, & 529. 1980.

CASSELIA INTEGRIFOLIA Nees & Mart.

Additional bibliography: D. Dietr., Syn. Pl. 3: 606. 1843; Walp., Repert. Bot. Syst. 4: 40. 1845; D. H. Scott in Soler., Syst. Anat. Dicot. [transl. Boodle & Fritsch] 2: 1021. 1908; H. N. & A. L., Mold., Pl. Life 2: 59. 1948; Mold., Phytologia 40: 478. 1978; Mold., Phytol. Mem. 2: 139, 347, & 529. 1980.

Hatschbach encountered this plant on campo cerrado, flowering in November, and reports the corollas as "rose"-color when fresh.

Additional citations: BRAZIL: Mato Grosso: Hatschbach 37421

(Eu—46936).

CASSELIA INTEGRIFOLIA var. *FISCHERI* (Mart.) Mold.

Additional bibliography: D. Dietr., Syn. Pl. 3: 618. 1843; Mold., Phytologia 40: 478. 1978; Mold., Phytol. Mem. 2: 347 & 529. 1980.

CASSELIA MANSOI Schau.

Additional & emended bibliography: C. Muell. in Walp., Ann. Bot. Syst. 5: 705. 1860; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 157, fig. G & J. 1895; S. Moore, Trans. Linn. Soc. Lond. Bot., ser. 2, 4: 439 & 521. 1895; H. N. & A. L. Mold., Pl. Life 2: 83. 1948; Mold., Phytologia 40: 479. 1978; Mold., Phytol. Mem. 2: 139, 173, & 529. 1980.

Additional illustrations: Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 157, fig. G & J. 1895.

Recent collectors describe this plant as decumbent and have encountered it at 170 m. altitude, flowering and fruiting in April. The corollas are said to have been "violet" in color on the collection cited below.

Additional citations: BOLIVIA: Santa Cruz: Krapovickas & Schinini 36181 (Ld).

CASSELIA ROSULARIS Sandw.

Additional bibliography: Mold., Phytologia 40: 479. 1978; Mold., Phytol. Mem. 2: 139 & 529. 1980.

Oliveira describes this plant as having a xylopodium and "lilac"-colored corollas. He found it growing on campo cerrado, in full flower in September.

Additional citations: BRAZIL: Mato Grosso: Oliveira 51 (Ld), 53 (Ld).

CASSELIA SERRATA Nees & Mart.

Additional bibliography: D. Dietr., Syn. Pl. 3: 606. 1843; Mold., Phytologia 40: 478 & 479. 1978; Mold., Phytol. Mem. 2: 139 & 529. 1980.

CASSELIA VERONICAEFOLIA Cham.

Additional bibliography: D. Dietr., Syn. Pl. 3: 605. 1843; Mold., Phytologia 40: 479. 1978; Mold., Phytol. Mem. 2: 139 & 529. 1980.

CASSELIA ZELOTA (Mold.) Mold.

Additional bibliography: Mold., Phytologia 40: 479. 1978; Hocking, Excerpt. Bot. A.33: 90. 1979; Mold., Phytol. Mem. 2: 139 & 529. 1980.

ADDITIONAL NOTES ON THE GENUS CHASCANUM. IX

Harold N. Moldenke

The last previous installment of notes on this genus was published in *Phytologia* 40: 479—486 (1978). For an explanation of the herbarium acronyms employed in this and all others in my series of notes on the genera of this and certain other families, see *Phytologia Memoirs* 2: 463—469 (1980) and *Phytologia* 50: 268 (1980).

CHASCANUM E. Mey.

Additional synonymy: Denisia Neck. apud Post & Kuntze, *Lexicon* 688. 1904. Chaschanum E. Mey. ex Gledhill, *East. Cape Veld Fls.* 201. 1969.

Additional & emended bibliography: Poir. in Lam., *Encycl. Méth.* Bot. 5: 286. 1804; Endl., *Gen. Pl.* 1: 634. 1838; Meisn., *Pl. Vasc. Gen.* 2: 199. 1840; Reichenb., *Deutsch. Bot. [Repert. Herb. Nom.]* 108. 1841; D. Dietr., *Syn. Pl.* 3: 371 & 605. 1843; Walp., *Repert. Bot. Syst.* 4: 38—39. 1845; Lindl., *Veg. Kingd.* 664. 1846; A. L. Juss. in Orbigny, *Dict. Univ. Hist. Nat.* 13: 185. 1849; Pfeiffer, *Nom. Bot.* 2 (1): 132 & 759 (1874) and 2 (2): 1570. 1874; Baill., *Hist. Pl.* 11: 102. 1891; Briq. in Engl. & Prantl, *Nat. Pflanzenfam.*, ed. 1, 4 (3a): 154. 1895; Post & Kuntze, *Lexicon* 117 & 688. 1904; Chiov., *Fl. Somalia* [1]: 49 & 274. 1929; Levyns, *Guide Fl. Cape Penins.* 216. 1929; A. Chev., *Rev. Bot. Appl. Agric. Trop.* 15: 913. 1935; Worsdell, *Ind. Lond. Suppl.* 1: 132. 1941; Erdtman, *Svensk Bot. Tidsk.* 39: 281—284. 1945; Kidd, *Wild Fls. Cape Penins.* pl. [40], fig. 6. 1950; Dalla Torre & Harms, *Gen. Siphonog.*, imp. 2, 431. 1958; Van Campo, *Bull. I.F.A.N.* 20 (A-3): 753—760. 1958; Anon., *Kew Bull. Gen. Ind.* 47, 72, & 273. 1959; Nair & Reiman, *Bull. Bot. Gard. Lucknow* 76: 3. 1962; Dalla Torre & Harms, *Gen. Siphonog.*, imp. 3, 430. 1963; Puri, Jain, Mukerjee, Sarup, & Kotwal, *Rec. Bot. Surv. India* 19: 1107. 1964; Gledhill, *East. Cape Veld Fls.* 201. 1969; Rouleau, *Guide Ind. Kew.* 41. 1970; Mukhopadhyay, *Pollen Morph. Verb. [thesis]*. 1971; Thanikaimoni, *Inst. Franç. Pond. Trav. Sect. Scient. Tech.* 12 (2): 30 (1973) and 13: 39, 56, & 328. 1976; Ozenda, *Fl. Sahara*, ed. 2, 407. 1977; Bhandari, *Fl. Indian Des.* 308—309, fig. 116. 1978; Gibson, *Wild Fls. Natal* 92, pl. 92, fig. 7. 1978; Mukherjee & Chanda, *Trans. Bose Res. Inst.* 41: 47, 48, 54, & 57. 1978; Mold., *Phytologia* 40: 479—486, 506, 507, & 510 (1978) and 44: 112—116, 333, & 507. 1979; Hocking, *Excerpt. Bot. A.* 33: 90. 1979; Rogerson, Becker, & Prince, *Bull. Torrey Bot. Club* 106: 62. 1979; Mold., *Phytologia* 45: 40, 352, & 504. 1980; Mold., *Phytol. Mem.* 2: 4, 198—204, 216, 223, 224, 230, 232, 235, 236, 240, 242—244, 248, 253, 256, 259, 347, 379, 380, 396, 413, & 529—530. 1980; W. T. W. Morgan, *Econ. Bot.* 35: 124. 1981; Mold., *Phytologia* 47: 411, 456, & 504 (1981), 48: 451, 452, & 506 (1981), and 50: 251, 260, 505, & 506. 1982.

CHASCANUM ADENOSTACHYUM (Schau.) Mold.

Additional & emended bibliography: Mold., Revist. Sudam. Bot. 6: 16 & 23. 1939; Mold., Phytologia 40: 480. 1978; Hocking, Excerpt. Bot. A.33: 90. 1979; Mold., Phytol. Mem. 2: 236, 243, 244, & 529. 1980.

CHASCANUM ANGOLENSE Mold.

Additional bibliography: Mold., Phytologia 40: 480. 1978; Mold., Phytol. Mem. 2: 232 & 530. 1980; Mold., Phytologia 50: 251. 1982.

Goldsmith refers to this plant as a "low straggler in grassland and probably a garden escape, with minute white flowers in long narrow spikes" and his collection was misidentified and distributed as Stachytarpheta indica Vahl.

Additional citations: ZIMBABWE: Goldsmith 2/77 (Mu).

CHASCANUM ARABICUM Mold.

Additional bibliography: Mold., Phytologia 40: 480 (1978) and 44: 116. 1979; Mold., Phytol. Mem. 2: 202, 253, & 530. 1980.

CHASCANUM CAESPITOSUM (H. H. W. Pearson) Mold.

Additional bibliography: Mold., Phytologia 40: 480. 1978; Mold., Phytol. Mem. 2: 244 & 530. 1980.

CHASCANUM CERNUUM (L.) E. Mey.

Additional & emended bibliography: D. Dietr., Syn. Pl. 3: 605. 1843; Walp., Repert. Bot. Syst. 4: 38. 1845; Levyns, Guide Fl. Cape Penins. 216. 1929; Mold., Revist. Sudam. Bot. 6: 17 & 24. 1939; Worsdell, Ind. Lond. Suppl. 1: 132. 1941; Kidd, Wild Fls. Cape Penins. pl. [40], fig. 6. 1950; Mold., Phytologia 40: 480. 1978; Mukherjee & Chanda, Trans. Bose Res. Inst. 41: 47. 1978; Mold., Phytol. Mem. 2: 244, 379, & 530. 1980.

Additional illustrations: Levyns, Guide Fl. Cape Penins. 216. 1929; Kidd, Wild Fls. Cape Penins. pl. [40], fig. 6 (in color). 1950.

Recent collectors have found this plant growing in association with Struthiola garciana. Kidd (1950) describes it as "A straggling shrublet up to 1 ft. [tall]; occasional on flats from Fish Hoek to the south", flowering there from July to September.

Additional citations: SOUTH AFRICA: Cape Province: Dahlgren & Peterson F.120 (Go).

CHASCANUM DEHISCENS (L. f.) Mold.

Additional & emended bibliography: Poir. in Lam., Encycl. Méth. Bot. 5: 286. 1804; D. Dietr., Syn. Pl. 3: 605. 1843; Walp., Repert. Bot. Syst. 4: 38. 1845; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 154. 1895; Mold., Revist. Sudam. Bot. 6: 17, 23, & 24. 1939; Gledhill, East. Cape Veld Fls. 201, pl. 53, fig. 1. 1969; Mold., Phytologia 40: 481 & 482. 1978; Mukherjee & Chanda, Trans. Bose Res. Inst. 41: 47. 1978; Mold., Phytol. Mem. 2: 244, 347, 379, 380, 396, & 530. 1980.

Additional illustrations: Gledhill, East. Cap. Veld Fls. pl.

53, fig. 1. 1969.

Gledhill (1969) describes this plant as a shrub, about 30 cm. tall, the leaves olive-green, and the corollas white, their tube about 2 cm. long. He gives its distribution as "Occasional in dry mixed grassveld from Humansdorp to Peddie and inland to Graaff-Reinet and Queenstown" in South Africa, where, he avers, it blooms from September to April.

Linnaeus (1781) described this plant as "Phryma calicibus tandem longitudinaliter dehiscentibus". Poiret (1804) calls it "phryma à grappes" and notes "Si l'on considère dans cette plante la forme de la corolle, le caractère des semences, on concevra facilement qu'ils offroient des différences suffisantes pour séparer cette espèce des phryma. Linné fils le reconnoît lui-même, & il avoue qu'il l'eût fait s'il n'en eût empêché par la crainte de trop multiplier les genres."

Additional citations: SOUTH AFRICA: Cape Province: Bayliss BS.5053 (Ba); Dahlstrand 222 (Go).

CHASCANUM GARIPENSE E. Mey.

Additional & emended bibliography: D. Dietr., Syn. Pl. 3: 605. 1843; Walp., Repert. Bot. Syst. 4: 38. 1845; Mold., Revist. Sudam. Bot. 6: 17—18 & 23. 1939; Mold., Phytologia 40: 481—482 (1978) and 45: 352. 1980; Mold., Phytol. Mem. 2: 242, 244, 379, & 530. 1980.

Emended citations: SOUTH AFRICA: Cape Province: Drège s.n. [Afr. austr.; Herb. E. Meyer 3103] (E—118614—isotype); Henrici 2230 (W—1529030); F. R. R. Schlechter 11410 (W—553492); M. Schlechter s.n. [Stickhand, 17.V.1898] (E—118694).

CHASCANUM GILLETII Mold.

Additional & emended bibliography: Mold., Revist. Sudam. Bot. 6: 18—19 & 23. 1939; H. N. & A. L. Mold., Pl. Life 2: 61. 1948; Mold., Phytologia 40: 482. 1978; Mold., Phytol. Mem. 2: 202, 204, 230, & 530. 1980.

CHASCANUM GÜRKEANUM (Loes.) Mold.

Additional bibliography: Mold., Phytologia 40: 482. 1978; Mold., Phytol. Mem. 2: 242 & 530. 1980.

CHASCANUM HANNINGTONII (Oliv.) Mold.

Additional bibliography: H. N. & A. L. Mold., Pl. Life 2: 62. 1948; Mold., Phytologia 40: 482. 1978; Mold., Phytol. Mem. 2: 224 & 530. 1980.

CHASCANUM HEDERACEUM (Sond.) Mold.

Additional & emended bibliography: Mold., Revist. Sudam. Bot. 6: 19, 23, & 24. 1939; Mold., Phytologia 40: 481 & 482. 1978; Mukherjee & Chanda, Trans. Bose Res. Inst. 41: 47. 1978; Mold., Phytol. Mem. 2: 235, 236, , 240, 242—244, 396, & 530. 1980.

Recent collectors have found this plant growing in lightly wooded areas with granite bottom in association with Protea caffra

and on severely grazed land on dolomite bottom with no wind protection, at 1800 m. altitude, in both flower and fruit in December and February. The corollas are said to have been "white" on Clarke 421.

Additional citations: SOUTH AFRICA: Transvaal: B. Clarke 421 Dahlstrand 849 (Go), 1053 (Go), 1092 (Go).

CHASCANUM HEDERACEUM var. NATALENSE (H. H. W. Pearson) Mold.

Additional bibliography: Good & Exell, Journ. Bot. 68: Suppl. 140. 1930; Mold., Phytologia 40: 482. 1978; Mold., Phytol. Mem. 2: 235, 240, 243, 244, 396, & 530. 1980.

CHASCANUM HILDEBRANDTII (Vatke) Gillett

Additional bibliography: Anon., Kew Bull. Gen. Index 72. 1959; Mold., Phytologia 40: 482--483 (1978) and 44: 116. 1979; Mold., Phytol. Mem. 2: 204, 223, 224, 230, & 530. 1980.

Linsen & Giesen encountered this plant in sandy soil in the wetter parts of lithosolic slopes of granite-porphyrries and gneisses, describing it as an erect herb, 35--40 cm. tall, the roots brownish-gray, scaly, the stems brown or light-brown and also scaly, the younger stems green with some red longitudinal lines especially near the origin of the petioles, the petioles reddish-brown, the mid-vein of each leaf with a touch of red and the leaf-margins sometimes reddish-brown, the corolla-tube creamy-white, the petals white, the anthers bright yellow, the receptacle small and green, and the filaments, style, stigma, and ovary pale-green to white. They found the plant growing at 1650 m. altitude, in flower in December.

Additional citations: KENYA: Linsen & Giesen 13 (W--2909743).

CHASCANUM HUMBERTI Mold.

Additional bibliography: Mold., Phytologia 40: 483. 1978; Mold., Phytol. Mem. 2: 248 & 530. 1980.

CHASCANUM INCISUM (H. H. W. Pearson) Mold.

Additional & emended bibliography: Mold., Revist. Sudam. Bot. 6: 19--20 & 24. 1939; Metcalfe & Chalk, Anat. Dicot. 2: 1031--1032. 1950; Mold., Phytologia 40: 483 & 485. 1978; Mukherjee & Chanda, Trans. Bose Res. Inst. 41: 48. 1978; Mold., Phytol. Mem. 2: 242, 244, 379, & 530. 1980.

CHASCANUM INCISUM var. CANESCENS Mold.

Additional bibliography: Mold., Phytologia 40: 483 & 485. 1978; Mold., Phytol. Mem. 2: 242 & 530. 1980.

CHASCANUM INSULARE Mold.

Additional bibliography: Mold., Phytologia 40: 483--484. 1978; Mold., Phytol. Mem. 2: 248 & 530. 1980.

CHASCANUM INSULARE var. CANESCENS Mold.

Additional bibliography: Mold., Phytologia 40: 484. 1978; Mold.,

Phytol. Mem. 2: 248 & 530. 1980.

CHASCANUM INSULARE var. HUMBERTI Mold.

Additional bibliography: Mold., Phytologia 40: 484. 1978; Mold., Phytol. Mem. 2: 248 & 350. 1980.

CHASCANUM INSULARE var. TRIANGULARE Mold.

Additional bibliography: Mold., Phytologia 31: 123. 1975; Mold., Phytol. Mem. 2: 248 & 530. 1980.

CHASCANUM INTEGRIFOLIUM (H. H. W. Pearson) Mold.

Additional bibliography: Mold., Phytologia 31: 123. 1975; Mold., Phytol. Mem. 2: 244 & 530. 1980.

CHASCANUM KROOKII (Gurke) Mold.

Additional & emended bibliography: Mold., Revist. Sudam. Bot. 6: 20 & 24. 1939; Mold., Phytologia 40: 484. 1978; Mold., Phytol. Mem. 2: 244 & 530. 1980.

CHASCANUM LATIFOLIUM (Harv.) Mold.

Additional & emended bibliography: Mold., Revist. Sudam. Bot. 6: 20 & 24. 1939; Mold., Phytologia 40: 484. 1978; Mold., Phytol. Mem. 2: 243, 244, & 530. 1980.

CHASCANUM LATIFOLIUM var. GLABRESCENS (H. H. W. Pearson) Mold.

Additional & emended bibliography: Mold., Revist. Sudam. Bot. 6: 20 & 24. 1939; Mold., Phytologia 31: 124. 1975; Mold., Phytol. Mem. 2: 243, 244, & 530. 1980.

CHASTANUM LATIFOLIUM var. TRANSVAALENSE Mold.

Additional & emended bibliography: Mold., Revist. Sudam. Bot. 6: 20 & 24. 1939; Mold., Phytologia 40: 484. 1978; Mold., Phytol. Mem. 2: 244 & 530. 1980.

CHASCANUM LIGNOSUM (Dinter) Mold.

Additional bibliography: Mold., Phytologia 40: 484. 1978; Mold., Phytol. Mem. 2: 242, 244, & 530. 1980.

CHASCANUM MARRUBIIFOLIUM Fenzl

Emended synonymy: Bouchea marrubiifolia Schau. apud Wight, Icon. Pl. Ind. Orient. 4: pl. 1461. 1849.

Additional & emended bibliography: D. Dietr., Syn. Pl. 3: 605. 1843; Walp., Repert. Bot. Syst. 4: 38—39. 1845; Wight, Icon. Pl. Ind. Orient. 4 (3): 10, pl. 1461. 1849; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 154. 1895; Chiov., Fl. Somalia [1]: 56 & 274. 1929; Xavier Louis & Monod, Bull. Agenc. Gén. Colon. 27: 605 & 626. 1934; A. Chev., Rev. Bot. Appl. Agric. Trop. 15: 913. 1935; Mold., Revist. Sudam. Bot. 6: 21, 23, & 24. 1939; Monod, Contrib. Etud. Sahara Occid. 2: 113, 114, & 170, pl. 21. 1940; Nair & Rehman, Bull. Nat. Bot. Gard. Lucknow 76: 10—11, pl. 2, fig. 7, & text-fig. 17. 1962; Thanikaimoni, Inst. Franç. Pond.

Trav. Sect. Scient. Tech. 13: 39. 1976; Ozenda, Fl. Sahara, ed. 2, 407. 1977; Bhandari, Fl. Indian Des. 308--309, fig. 116. 1978; Mukherjee & Chanda, Trans. Bose Res. Inst. 41: 48. 1978; Mold., Phytol. Mem. 2: 198--202, 204, 216, 230, 253, 256, 259, 347, 379, 413, & 530. 1980; Mold., Phytologia 40: 484 (1978), 44: 116 (1979), and 48: 151. 1981; W. T. W. Morgan, Econ. Bot. 35: 124. 1981.

Additional illustrations: Wight, Icon. Pl. Ind. Orient. 4: pl. 1461. 1849; Erdtman, Svensk Bot. Tidsk. 39: 282, fig. 3. 1945; Jafri, Fl. Karachi fig. 282. 1966; Bhandari, Fl. Indian Des. 309, fig. 116. 1978.

Bhandari (1978) refers to this species as "A rare plant found on the open, grassy hill tops or on gravel, but locally abundant" in Rajasthan. He lists the vernacular name, "bai", for it and cites his nos. 70, 413, 1019, & 1588 and Blatter 10375 & 10385 from Rajasthan. He gives the overall distribution of the plant as tropical Africa, Abyssinia, Egypt, Arabia, Sind (Pakistan), and Rajasthan (India) and avers that it flowers and fruits from September to December. Morgan (1981) lists it from Kenya, where he claims that it is of economic use and has the vernacular name, "ekajamait".

Puri and his associates (1964) also lists the species from Rajasthan, citing Blatter & Hall s.n., Jain 40026, Puri 23997, Ratnam s.n., and Sarup s.n., describing it as "A much branched woody herb; leaves suborbicular, strongly nerved; flowers sessile, in elongated spikes up to 20 cm. long, closely appressed to [the] rachis".

Additional citations: MOUNTED ILLUSTRATIONS: Monod, Contrib. Etud. Sahara Occid. 2: pl. 21. 1940 (N).

CHASCANUM NAMAQUANUM (H. Bolus) Mold.

Additional & emended bibliography: Mold., Revist. Sudam. Bot. 6: 21, 22, & 24. 1939; Mold., Phytologia 40: 485. 1978; Mold., Phytol. Mem. 2: 244 & 530. 1980.

CHASCANUM PINNATIFIDUM (L. f.) E. Mey.

Additional & emended bibliography: D. Dietr., Syn. Pl. 3: 605. 1843; Walp., Repert. Bot. Syst. 4: 39. 1845; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 154. 1895; Mold., Revist. Sudam. Bot. 6: 22 & 24. 1939; Mold., Phytologia 40: 483 & 485. 1978; Mukherjee & Chanda, Trans. Bose Res. Inst. 41: 48. 1978; Mold., Phytol. Mem. 2: 236, 242--244, & 530. 1980.

Seydel encountered this plant at 1600 m. altitude, fruiting in April. Clarke refers to it as infrequent on grassveld with scattered trees, the corollas being "yellow".

Additional citations: NAMIBIA: B. Clarke 2528 (Mu); Seydel 2361 (Go). SOUTH AFRICA: Cape Province: Drège 822a (E--118616), 822b (E--118616).

CHASCANUM PINNATIFIDUM var. RACEMOSUM Schinz & Mold.

Additional & emended bibliography: Mold., Revist. Sudam. Bot. 6: 22 & 24. 1939; Mold., Phytologia 31: 235. 1975; Mold., Phytol.

Mem. 2: 236, 242, 244, & 530. 1980.

CHASCANUM PUMILUM E. Mey.

Additional bibliography: D. Dietr., Syn. Pl. 3: 605. 1843; Walp., Repert. Bot. Syst. 4: 38. 1845; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 154. 1895; Good & Exell, Journ. Bot. 68: Suppl. 140. 1930; Mold., Phytologia 40: 485--486. 1978; Mukherjee & Chanda, Trans. Bose Res. Inst. 41: 48. 1978; Mold., Phytol. Mem. 2: 232, 242--244, & 530. 1980.

Emended citations: SOUTH AFRICA: Cape Province: Zeyher 1366 (W-1578088).

CHASCANUM PUMILUM var. PUBERULENTUM Mold.

Additional & emended bibliography: Mold., Revist. Sudam. Bot. 6: 22--24. 1939; Mold., Phytologia 31: 236. 1975; Mold., Phytol. Mem. 2: 244 & 530. 1980.

CHASCANUM RARIFLORUM (A. Terrac.) Mold.

Additional bibliography: Fedde & Schust., Justs Bot. Jahresber. 39 (2): 319. 1913; Mold., Phytologia 31: 236--237. 1975; Mold., Phytol. Mem. 2: 203 & 530. 1980.

CHASCANUM SCHLECHTERI (Gürke) Mold.

Additional bibliography: Gibson, Wild Fls. Natal 92, pl. 92, fig. 7. 1978; Mold., Phytologia 40: 486. 1978; Mold., Phytol. Mem. 2: 240, 243, 244, & 530. 1980.

Illustrations: Gibson, Wild Fls. Natal pl. 92, fig. 7 (in color). 1978.

Gibson (1978) describes this plant as a small perennial herb, to 16 cm. tall, flowering in November, with creamy-white corollas.

CHASCANUM SCHLECHTERI var. TORREI Mold.

Additional bibliography: Mold., Phytologia 31: 237. 1975; Mold., Phytol. Mem. 2: 240 & 530. 1980.

CHASCANUM SESSILIFOLIUM (Vatke) Mold.

Additional bibliography: Chiov., Fl. Somalia [1]: 49. 1929; Mold., Phytologia 40: 486. 1978; Hocking, Excerpt. Bot. A.33: 90. 1979; Mold., Phytol. Mem. 2: 204, 379, & 530. 1980.

Kazmi and his associates found this plant in flower and fruit in December and describe the corollas as "yellow, rose-lipped".

Additional citations: SOMALIA: Kazmi, Elmi, Mahamoud, & Suliman 237 (Mu).

NOTES ON NEW AND NOTEWORTHY PLANTS. CLXIII

Harold N. Moldenke

CLERODENDRUM COLEBROKIANUM var. *HENRYANUM* Mold., var. nov.

Haec varietas a forma typica speciei calicibus apicaliter minute 5-dentatis recedit.

This variety differs from the typical form of the species in having the calyx, both in anthesis and in fruit, merely apically minutely 5-dentate or -denticulate.

The variety is based on A. Henry 12421a from Szeneo, Yunnan, China, deposited in the Britton Herbarium at the New York Botanical Garden.

CLERODENDRUM UMBELLATUM f. *SCANDENS* (P. Beauv.) Mold., stat. nov.

Clerodendrum scandens P. Beauv., Fl. Oware 2: 6--7, pl. 62. 1808.

The typical form of this species has dark red corollas, while the present form has them white.

VERBENA DISSECTA f. *CAPITATA* Mold., f. nov.

Haec forma a forma typica speciei inflorescentiis maturis capitatis vel subcapitatis recedit.

This form differs from the typical form of the species in having its mature inflorescences remaining capitate or subcapitate, not conspicuously elongating.

The type of this form was collected by Wilhelm Gustav Herter (1884--1958) as his no. 1805 [Herb. Herter 96556] in dry, sandy, littoral soil, fully exposed to the sun, at 2--3 m. altitude, Montevideo, Uruguay, on October 6, 1935, and is deposited in the United States National Herbarium at Washington. The collector describes the plant as 50 cm. tall, the flowers odorous and "pajas blancas". He distributed it as *V. laciniata* (L.) Briq. "var. *albida* c. form. ad typ. verg." This is the taxon which I have in the past been regarding as representing *V. pulchella* Sweet [not *V. tenuisecta* Briq.].

NEW STATE RECORDS AND OTHER NOTEWORTHY
COLLECTIONS FOR THE ILLINOIS VASCULAR FLORA

R. D. Henry and A. R. Scott

R.M. Myers Herbarium and Institute for Environmental Management
Western Illinois University, Macomb, IL 61455

ABSTRACT: Twenty-one Illinois vascular plant distribution records are reported, three of which are new taxa in the spontaneous Illinois vascular flora.

INTRODUCTION

Two species and one subspecies of vascular plants new to the Illinois flora are reported. Additionally, collections of 18 other species having noteworthy distributions in Illinois are discussed. Nomenclature follows Kartesz and Kartesz (1980) or Mohlenbrock (1975) except as noted. Unless otherwise indicated, distribution information was derived from Mohlenbrock and Ladd (1978). All plants were collected by the authors and their collection number(s) and dates are given with the citation of each taxon. Voucher specimens are deposited in the R. M. Myers Herbarium of Western Illinois University (MWI).

STATE RECORDS

Chenopodium pumilio R. Br. (#2154, 2155)

Specimens of this species new to the spontaneous vascular flora were collected on August 1 and 19, 1980 in open waste ground near a residence in central McDonough County. Only a couple of plants were present, and these were later destroyed; however, in 1982 several plants of this species reappeared near the original location. The species is native to Australia and has been found in Massachusetts, New York, New Jersey, Ohio, Pennsylvania, District of Columbia in the eastern United States and west of the Mississippi from Missouri to Texas and California. In Missouri it has been found in 24, mostly southern, counties, the nearest location to this Illinois find being in St. Louis County about 150 miles away (Steyermark, 1963).

Euphorbia hexagona Nutt. (#1313, 1936)

Specimens were collected from a sandy dike along the Mississippi River in northwestern Mercer County on September 24, 1980 and July 7, 1981. A number of scattered plants were present. This species is a native of the western plains, and Gleason (1963) lists its distribution as Minnesota to Montana, south to Missouri, Texas and New Mexico. Steyermark (1963) does not record it from Missouri, nor does Pohl (1975) for Iowa, or Mohlenbrock (1982) for Illinois.

Delphinium carolinianum Walt. ssp. penardii (Huth.) Warnock (#1809, 1810)

Specimens of this subspecies were collected on May 27, 1980 along a railroad track in eastern Henderson County, where there were several plants growing. According to Warnock (1981) the subspecies ranges across the Great Plains and Front Range foothills with the nearest locations to Illinois being in Louisa and Muscatine Counties, Iowa, which are about 30 miles from this report. Warnock, who determined the specimens, annotated them as "unusual for Illinois; probably from seed brought by rail; these specimens have many characters of plants from Rocky Mountain foothills and central Tennessee."

RECORDS OF DISTRIBUTIONAL INTEREST

Brassica kaber (DC.) L. C. Wheeler var. schkuhriana (Reichenb.) L. C. Wheeler (#1908)

This plant was collected on May 27, 1980 along a railroad in Henderson County. Mohlenbrock (1980) states that this variety is "rare and scattered throughout the state" and indicates collections from six other counties, none in west-central Illinois. This species previously has not been recorded for Henderson County.

Cerastium pumilum Curtis (#2253)

Collected from sandy soil in Cass County on May 16, 1981, this species previously was reported only from Jackson County about 160 miles to the south (Mohlenbrock and Ladd, 1978).

Chorispora tenella (Willd.) DC. (#1929)

This species was collected beside a railroad in Henderson County on May 27, 1980. It was first recorded in the state in 1974 (Mohlenbrock 1980) and it previously has been reported for only nine counties, seven being in the northeast corner of the state. This is the first collection in west-central Illinois which is about 100 miles from the nearest previously reported station. Only one plant was found at this station, and the species does not appear to persist since Mohlenbrock (1980) states that "by 1978, it had disappeared from most of the original Illinois stations."

Coreopsis grandiflora Hogg. (#2160)

A station of this species, the first in west-central Illinois, was located along a highway in McDonough County on June 21, 1980.

Elaeagnus umbellata Thunb. (#2149)

Specimens were collected from a creek bank in McDonough County on November 15, 1980. This mature fruiting shrub is assumed to be a bird transported escape from cultivation via seeds. Previously in Illinois it has been reported from five eastern and southern counties (Mohlenbrock 1982) the nearest such

location being about 150 miles distant.

Haplopappus ciliatus (Nutt.) DC. (#1535, 1808, 1825-1829)

Specimens of this plant were collected between June and September, 1980 from two stations along a railroad in Henderson County. This first collection of the taxon in west-central Illinois is about 100 miles from the nearest of the previously eight reported counties (Shildneck, et al., 1981; Mohlenbrock and Ladd, 1978).

Heterotheca latifolia Buckl. (#1830-1832, 1843-1844)

Numerous plants of this species were growing in 1980 along a railroad in Henderson County. The number of Illinois counties in which the species is known to occur is now eleven (Shildneck, et al., 1981; Mohlenbrock and Ladd, 1978). This species has had a rather rapid increase since 1975 when Mohlenbrock (1975) cited it from only three counties and stated its occurrence as rare. Seven of the eleven counties are in southern Illinois. Henderson County is the first one in west-central Illinois being about 60 miles southwest of the nearest previously reported station.

Lappula redowskii (Hornem.) Greene var. occidentalis (Watts.) Rydb. (#1906)

A specimen of this taxon was collected in May, 1980 by a railroad in Henderson County and is the fifth and southernmost county by about 50 miles for its known occurrence in Illinois.

Leonurus marrubiastrum L. (#1507)

Although this species occurs in a number of counties, it has been notably absent from west-central Illinois until this collection from Mercer County in September 1980.

Linaria dalmatica (L.) Mill. (#1930)

A collection of this species was made on May 27, 1980 from a large population of plants growing along a railroad in Henderson County. It is now known from seven counties in the state including being the second county of its occurrence in western Illinois. Henderson County is its present southern most limit in the state.

Lobularia maritima (L.) Desv. (#2138)

This ornamental plant which sometimes escapes has already been recorded for six counties. On July 25, 1981, a spontaneous flowering specimen was found in the crack of a parking lot in Macomb, McDonough County.

Miscanthus sacchariflorus (Maxim.) Hack. (#1512-1513)

Many plants of this species were found growing by a roadside on September 24, 1980 in Mercer County which is the southern-most county in which this species is known to occur in the state.

Previously, it has been recorded for six other northern counties, including Rock Island which borders Mercer County on the north.

Specularia leptocarpa (Nutt.) Gray. (#1586)

Known previously from only five counties, a collection of this species was made on June 20, 1980 from a railroad right-of-way in Henderson County. This is the first report of this taxon from west of the Illinois River in the state.

Papaver dubium L. (#2280)

A specimen of this species was collected on June 4, 1981 from a large population of plants growing along an abandoned railroad in eastern Cass County. Mohlenbrock (1981) records this species from only two counties, the first being in 1879.

Petunia X hybrida Vilm. (#2136)

Specimens were found growing spontaneously and in flower by the edge of a street in Macomb, McDonough County on August 2, 1981. This common cultivated species previously has been recorded for only four other counties.

Physalis ixocarpa Brotero (#2170)

This species is recorded from three counties in the state. Each county is in a different part of the state, i.e., northeast, southeast, and southwest. This fourth report is from McDonough County in the west northwest part of the state. This species was originally collected from a floodplain about 1968 from a small population of plants at the edge of a cultivated field. The specimen referred to here (#2170) was collected on August 1, 1980 from plants grown in the University greenhouse from seeds derived from the 1968 collection.

Viburnum opulus L. (#2134)

Although previously reported from 20 Illinois counties (Henry, et al., 1978; Mohlenbrock and Ladd, 1978), this is the first report of the species west of the Illinois River in west-central Illinois. It occurs mostly in the northeastern counties (13) with fewer in the mid-central (6) and southern counties (1). This specimen was collected in McDonough County (west-central Illinois) at the edge of a woods on May 15, 1981.

Vernonia missurica Raf. f. carnea Standl. (#2137)

Even though V. missurica Raf. is common throughout Illinois, Mohlenbrock (1975) notes that rarely are rose-flowered (f. carnea) specimens observed and there are no distribution maps for it in Mohlenbrock and Ladd (1978). A collection of f. carnea was made on August 25, 1981 from a roadside in McDonough County.

ACKNOWLEDGEMENTS

We gratefully acknowledge the Western Illinois University Institute for Environmental Management and the Western Illinois University Research Council for providing travel funds in support of this project.

LITERATURE CITED

- Gleason, H. A. 1963. The New Britton and Brown Illustrated Flora of the Northeastern United States and Adjacent Canada. Vol. 2. Hafner Publishing Company, New York.
- Henry, R. D., A. R. Scott and P. Shildneck. 1978. Additions to the distribution of Illinois vascular plants. Trans. III. State Acad. Sci. 71(1):51-61.
- Kartesz, J. T. and R. Kartesz. 1980. A Synonymized Checklist of the Vascular Flora of the United States, Canada, and Greenland. The University of North Carolina Press, Chapel Hill.
- Mohlenbrock, R. H. 1975. Guide to the Vascular Flora of Illinois. Southern Illinois University Press, Carbondale.
- Mohlenbrock, R. H. 1980. The Illustrated Flora of Illinois--Flowering Plants: Willows to Mustards. Southern Illinois University Press, Carbondale.
- Mohlenbrock, R. H. 1981. The Illustrated Flora of Illinois--Flowering Plants: Magnolias to Pitcher Plants. Southern Illinois University Press, Carbondale.
- Mohlenbrock, R. H. 1982. The Illustrated Flora of Illinois--Flowering Plants: Basswoods to Spurges. Southern Illinois University Press, Carbondale.
- Mohlenbrock, R. H. and D. M. Ladd. 1978. Distribution of Illinois Vascular Plants. Southern Illinois University Press, Carbondale.
- Pohl, R. W. 1975. Keys to Iowa Vascular Plants. Kendall/Hunt Publishing Company, Dubuque, Iowa.
- Shildneck, P., A. G. Jones and V. Muhlenbach. 1981. Additions to the vouchered records of Illinois plants and a note on the occurrence of Rumex cristatus in North America. Phytologia 47(4):265-290.
- Steyermark, J. A. 1963. Flora of Missouri. The Iowa State University Press, Ames.
- Warnock, M. J. 1981. Biosystematics of the Delphinium carolinianum complex (Ranunculaceae). Syst. Bot. 6(1):38-54.

ASPECTS OF THE WEED COMPONENT OF THE SPONTANEOUS ILLINOIS VASCULAR PLANT FLORA

R. D. Henry

The R. M. Myers Herbarium

Western Illinois University, Macomb, IL 61455

ABSTRACT: There are 442 weed species in the spontaneous Illinois vascular flora which represent about 16% of this flora. Native plants comprise 63% of these species. Eighty-three percent of the alien weeds are from the old world, 46% were once cultivated and 82% were introduced before 1922. Most (97%) of the weed species are angiosperms with the Compositae being the largest family. Eight families consist of all weed species. Seventy-four percent of the weed species are herbaceous, 40% poisonous to humans, 13% poisonous to livestock, 22% drug plants, 88% terrestrial, 65% perennial, 68% occur throughout the state, and 48% are common in the state. From 1803-1978 there were 2.5 weed species entering the flora per year but the length of time for a plant to become a weed varies. It is suggested that weed lists should be carefully made always using specific epithets for all plants as well as consideration of their frequency and distribution in addition to their ecosystem context. Probably the number of weed species (perhaps mostly aliens) will increase as population trends and agricultural practices cause more disturbed land. This trend will occur at the expense of the native flora and ecosystem.

INTRODUCTION

Vascular plant weeds have been a long time antagonist of mankind. Batra (1982) states that weeds are potentially the most damaging pests in agroecosystems and lists their effects and thus the need to control them. Boyer (1982) cites weedy competitors as a cause of decreased crop yields and McWhorter and Patterson (1980) state weeds are estimated to cause a 10 to 15% reduction in soybean yield and quality for a loss of more than 350 million dollars annually. However, it should be recalled that plants, even if they are weeds, are first and foremost a part of the flora ecosystem and should be primarily studied in such a context. The purpose of this paper is to present a profile of the vascular plant weeds of Illinois from the botanical perspective of them being a part of the dynamic flora of the state. Hopefully, this will indicate the character and trends of the weed flora which would be useful in the understanding and management of them.

The vascular plants considered to be present-day weeds in Illinois are those published in Lopinot (1981), Turgeon et al. (1980), Wax et al. (1981), and Fermanian et al. (1982). When the

specific epithet was not given but only the genus name or spp. or citations such as "similar," "another," "other," etc., the species included in this analysis were those plants in Holstun et al. (1971) which are also in Mohlenbrock and Ladd (1978). Family and species nomenclature was standardized to Mohlenbrock (1975). Hybrids and infraspecific taxa were excluded except when they were the only species. Mohlenbrock (1975) and Mohlenbrock and Ladd (1978) were used as the basis for the plants that compose the present-day spontaneous vascular flora of Illinois.

RESULTS

1. The Native and Alien Weed Species

There are 442 vascular plant weed species which represent 15.8% of the present-day species in the spontaneous Illinois vascular plant flora. Of these weed species 162 (37%) are aliens and 280 (63%) native plants. Of the Illinois flora native plants 280 (14%) are weeds and of the alien plants in the flora 162 (20%) are weeds. The seven legislated noxious Illinois weed species (Ill. Dept. of Agric., 1978) comprise 1.58% of the present-day Illinois weeds; of the seven, 5 (71%) are aliens and 2 (29%) are native. Actually there is another plant on the Illinois noxious weed list, Sorghum alnum, but surprisingly it is not on the published weed lists for Illinois used in this paper. Of William's (1980) 37 purposefully introduced plants into the United States that have become noxious (= non-poisonous) or poisonous weeds, 10 (27%) are weeds in Illinois. These 10 species represent 2.3% of the Illinois weed flora. Half of these 10 species are noxious and half are poisonous. Of Holm's (1969) 10 worst weeds in the world five (all aliens) occur in Illinois but only 4 (40%) (not Echinochloa colonum (L.) Link) are Illinois weeds and these represent only 0.9% of the Illinois weeds.

2. Analysis of the Alien Weed Species

Of the alien weed species 75 (46%) were once cultivated plants. Eighty-two percent of the alien weed species were introduced into Illinois before 1922, 11% between 1922-1955 and 7% from 1956-1978. Between 1803 and 1978 the average number of alien weed species introduced per year was 0.93. The number of alien weed species introduced per year from 1803-1921 was 1.1, between 1922-1955 was 0.54 and between 1956-1978 was 0.50 indicating a decrease to date per year for alien weed species; however, the number of aliens introduced into the Illinois spontaneous vascular flora in recent years is increasing since between 1956 and 1978 9.4 species were introduced per year (Henry & Scott 1981). Since there is a lag between time of introduction and time of becoming a weed a prediction could be made that in the future perhaps there will be an increasing number of alien weeds.

Most of the alien weeds are from the old world (83%) while the fewest (7%) originated from the new world tropics. The rest (10%) are from the United States outside of Illinois most being from the west (9%) (7% from the west and 2% from the southwest); eastern U.S. contributed 1%.

3. Taxonomic Distribution of the Weed Species

The weed species occur in four divisions. Five (1.1%) are Equisetophyta, one (0.2%) is a Polypodiophyta, eight (1.8%) are Pinophyta and 428 (96.9%) are Magnoliophyta. Thus the weed species are about 1% pteridophytes, 2% gymnosperms and 97% angiosperms. Within the angiosperms 72 (16.8%) are Liliopsida (monocots) and 356 (83.2%) are Magnoliopsida (dicots). The monocots represent 16.3% of the total weed flora species whereas the dicots compose 80.5%.

The weed species occur in 72 families. One (1.4%) belongs to the Equisetophyta, one (1.4%) is in the Polypodiophyta, two (2.8%) in the Pinophyta and 68 (94.4%) are Magnoliophyta. Thus the weed families are about 3% pteridophytes, 3% gymnosperms and 94% angiosperms. Within the angiosperms 12 (17.6%) are Liliopsida and 56 (82.4%) are Magnoliopsida. The monocots represent 16.7% of the total weed flora families whereas the dicots comprise 77.8%. The five largest families in the weed flora are Compositae (78), Poaceae (Gramineae) (36), Rosaceae (25), Fagaceae (19) and Polygonaceae (16). There are eight families (11% of the weed families and 5% of the families in the Illinois vascular flora) that consist of 100% weed species: Aizoaceae, Cabombaceae, Martyniaceae, Nelumbonaceae, Nymphaeaceae, Phytolaccaceae, Typhaceae and Zannichelliaceae. These families are all herbaceous angiosperms two being monocot and six dicot.

The weed species occur in 188 genera. One (0.5%) belongs to the Equisetophyta, one (0.5%) is in the Polypodiophyta, two (1.0%) in the Pinophyta and 184 (98%) are Magnoliophyta. Thus the weed genera are about 1% pteridophytes, 1% gymnosperms and 98% angiosperms. Within the angiosperms 36 (19.6%) are Liliopsida and 148 (80.4%) are Magnoliopsida. The monocots represent 19.1% of the total weed flora genera and the dicots 78.7%. The largest genera in the weed flora are Quercus (19), Polygonum (12), Carya (9), Amaranthus (9), Potamogeton (9), Veronica (9), Prunus (8), Rubus (8), Salix (7), Pinus (7), Populus (7), Aster (7), Bidens (7), and Solidago (7). There are 51 genera (27% of the weed genera and 6% of the genera in the Illinois vascular flora) that consist of 100% weed species: Abutilon, Achillea, Agrostemma, Berteroa, Brasenia, Cabomba, Campsis, Cannabis, Capsella, Cardaria, Carduus, Cenchrus, Cephalanthus, Cichorium, Conium, Convolvulus, Corylus, Cycloloma, Cynodon, Dracocephalum, Echinocystis, Eleusine, Ellisia, Erigeron, Fraxinus, Galinsoga, Glecoma, Kochia, Maclura, Mollugo, Morus,

Nelumbo, Nepeta, Nuphar, Nymphaea, Onopordum, Pastinaca, Phytolacca, Proboscidea, Prunella, Pteridium, Rhus, Sicyos, Sonchus, Symphoricarpos, Taraxacum, Teucrium, Typha, Ulmus, Zannichellia and Zosterella. Of these genera 42 are herbaceous and 9 woody; 50 are angiosperms (44 dicots, 6 monocots) and one is a fern.

4. Woody and Herbaceous Habit of the Weed Species

Of the weed species 116 (26.2%) are woody and 326 (73.8%) are herbaceous. Of the woody plants 96 (82.8%) are native and 20 (17.2%) are aliens whereas of the herbaceous species 184 (56.4%) are native and 142 (43.6%) are alien. All of the pteridophytes are herbaceous, all of the gymnosperms woody and in the angiosperms 25.2% (108) are woody and 74.8% (320) are herbaceous. Of all the weed families (72) 18 (25%) are woody and 57 (79%) are herbaceous (the total is over 100% due to an overlap of 3 families). Of all the weed genera (188) 29 (15.4%) are woody and 160 (85.1%) are herbaceous (the total exceeds 188 and 100% due to the overlap of the one genus Artemisia). The largest herbaceous weed families are Compositae (77), Poaceae (36), Polygonaceae (16), Cruciferae (15) and the Scrophulariaceae and Cyperaceae each with 2 species. The largest woody weed families are Rosaceae (22), Fagaceae (19), Salicaceae (14), Juglandaceae (9), and Ulmaceae (8). The largest herbaceous weed genera are Polygonum (12), Amaranthus (9), Potamogeton (9), Veronica (9), Aster (7), Bidens (7), Solidago (7), Cuscuta (6), Scirpus (6), Erigeron (6), Eupatorium (6), Physalis (6), Artemisia (5), Carex (5), and Equisetum (5). The largest woody weed genera are Quercus (19), Carya (9), Prunus (8), Rubus (8), Salix (7), Populus (7), Pinus (7), Acer (6), and Ulmus (6). Listed in part 3 of this paper are the 8 families that are 100% herbaceous weeds (there are no woody 100% weed families) and the 100% weed (42 herbaceous and 9 woody) genera.

5. Poisonous Weed Species

Of the weed species 175 (39.6%) are poisonous to humans and 57 (12.9%) are poisonous to livestock. Plants poisonous to humans were determined from Hardin and Arena (1974) and for livestock from Evers and Link (1972).

6. Drug Plant Weed Species

Ninety-five (21.5%) of the weed species were on Tehon's (1951) list of Illinois drug plants.

7. Habitat of the Weed Species

Of the weed species 55 (12.4%) are aquatic and 387 (87.6%) are terrestrial.

8. Duration of the Weed Species

Of the weed species 131 (29.6%) are annual, 23 (5.2%) biennial and 288 (65.2%) are perennial.

9. Principal Illinois Distribution of the Weed Species

Based on Mohlenbrock and Ladd's (1978) distribution maps 299 (67.7%) of the weed species occur throughout the state while 85 (19.2%) occur in the northern two-thirds and 58 (13.1%) occur in the southern two-thirds of the state.

10. Frequency of Occurrence of the Weed Species

Mohlenbrock and Ladd (1978) was the source of the species county occurrence and the descriptors used were adapted from Schmid (1982); rare is 4% or less, occasional is 5-30%, often is 31-64% and common is 65-100%. Thirty-three (7.5%) of the weed species are rare (found in 1-4 counties), 95 (21.5%) are occasional (found in 5-31 counties), 103 (23.3%) occur often (32-65 counties) and 211 (47.7%) are common (66-102 counties).

11. Chronistic Changes of the Weed Species

In order to provide some information on the status and change of the Illinois weed flora through time reference has been made to Michaux (1803) the first plant collector in Illinois, to Mead (1846) who published the first flora of Illinois, to Flagg and Burrill (1878) who published a list of the plants of Illinois and Darlington (1922) who published a list of the introduced weed flora of Illinois. The data from these publications are compared to the data derived from the sources given in the introduction that were used as the sources of the weeds and vascular plants that comprise the present-day Illinois flora.

Michaux collected 89 plants, annotated none as weeds, but listed 31 (7%) of the species that are present-day weeds and which represented 35% of his Illinois collections. Only two of these 31 plants are aliens (Polygonum aviculare and P. hydropiper). Mead catalogued 913 plants, annotated 17 (1.8%) as weeds, but listed 229 (51.8%) of the species that are present-day weeds which represented 25% of his Illinois plants. Of the 17 annotated weeds 5 (29.4%) were alien (Chrysanthemum leucanthemum, Amaranthus hybridus, Digitaria sanguinalis, D. ischaemum, Bromus secalinus) and three (Cirsium discolor, C. muticum, C. pumilum) are not on the present-day weed list.

Flagg and Burrill catalogued 1570 plants, annotated 43 (2.7%) as weeds, but listed 332 (75.1%) of the species that are present-day weeds which represented 21% of his Illinois plants. However, it is of interest to note that of the 332 present-day weed species that are on their list 14 were annotated as cultivated (Acer platanoides, Prunus cerasus, P. avium, Rosa multiflora, Lonicera japonica, Helianthus annuus, Tragopogon porrifolius, Physalis alkekengi, Maclura pomifera, Populus alba, P. nigra italica, Pinus sylvestris, P. resinosa, Sorghum bicolor). Of the 43 annotated weeds 27 (62.8%) were alien and 14 are not on the present-day weed list (Linum usitatissimum, Agrimonia gryposepala, A. parviflora, Xanthium spinosum, Ambrosia bidentata, Polytmia canadensis, P. uvedalia, Bidens beckii, Anagallis arvensis, Nicandra physaloides, Chenopodium glaucum, C. murale, C. botrys, Euphorbia helioscopia).

Darlington's paper concerned only herbaceous alien species introduced before 1922. He did not annotate any specifically as weeds since he considered that any foreign plant may potentially be a weed. Of his 256 species only 109 (42.6%) are present-day weeds. Henry and Scott (1981) concluded that there were only 226 valid alien species on Darlington's list, of which the 109 present-day weeds would be 48.2%; also Henry and Scott concluded that the total number of alien species introduced into the spontaneous Illinois vascular flora before 1922 was actually 440 of which 142 (32.3%) are presently weeds. These 142 alien species introduced before 1922 represent 32% of the present-day Illinois weed species.

From 1803 to 1978 the number of weed species entering the Illinois spontaneous vascular flora per year is 2.5 (native plants being 1.6 and alien 0.9 species per year). During this time period the percent of native and alien species that make up the weed flora has not greatly changed since native plants were 71% and alien plants 29% of the annotated weeds in Meads 1846 flora and they are 63% and 37% respectively of the present weed flora. However, the proportion of the Illinois flora that are weeds has greatly increased being 17 (1.9%) in 1846, 43 (2.7%) in 1878, 22 (10.1%) in 1954 and 442 (15.9%) in 1978. Woody plants apparently have been weeds only in the last 30 years and now constitute 26% of the weeds, a rather rapid rise in proportion. In 1922, Darlington stated "Shrub and tree introductions--are excluded, as they are hardly to be counted as weeds" (although he did include two shrubs (Rosa eglanteria and Lycium halimifolium) in his list and mentioned Populus alba and Salix alba as examples of exclusions. All of these four plants except Lycium halimifolium are present-day weeds, however). Buchholtz et al. in 1954 only listed four species as woody weeds (Solanum dulcamara, Toxicodendron radicans, Campsis radicans, Rosa sulfata). Today there are 116 species of woody plants that are weeds. Neither Mead (1846) nor Flagg and Burrill (1878) included any woody plants in their annotation of weeds.

DISCUSSION

Like the vascular flora of the state, the weed flora is also dynamic in that it changes with time and certainly is not static. Therefore, it needs to be continually monitored and revised for changes including additions and deletions. Changes in the weed flora can be due to effectiveness of control methods, land management, changes in weather, grazing, plant growth and competition, plant introductions, pollution, change in species numbers and distribution, changes in habitat and methods of cultivation (see Froud-Williams et al. (1981) and Oldenstadt et al. (1982) for examples of the latter).

Several examples of these changes can be given. The years for the additions and deletions from the weed list were obtained from a comparative study of Lopinot (1963, 1965, 1968, 1971, 1976, 1979, 1981) Buchholtz et al. (1954), Slife et al. (1960) and Wax et al. (1981). Some native plants became weeds very early since in 1846 Mead annotated as weeds 12 such plants including Solanum carolinense, Erigeron canadensis, Ambrosia trifida and A. artemisiifolia which are on the present-day weed list. Muhlenbergia frondosa, Chenopodium hybridum and Amaranthus albus are native plants that were not added to the published weed list until 1960. Utricularia vulgaris was added in 1965, Cabomba caroliniana in 1976 and Teucrium canadense, Physalis subglabrata and Apocynum sibiricum in 1981. Likewise with alien species that have become weeds, the time varies between the year of introduction and when they are listed as weeds. Some alien plants became weeds soon after introduction as Chrysanthemum leucanthemum, Digitaria sanguinalis, D. ischaemum and Bromus secalinus which Mead annotated as weeds in 1846. Matricaria matricarioides was added to the weed list in 1960 which was 135 years after its introduction into Illinois in 1825. Other examples are 120 years (1861-1981) for Conium maculatum, 103 years (1857-1960) for Poa annua, 69 years (1912-1981) for Amaranthus powellii, 32 years (1949-1981) for Rosa multiflora, 30 years (1930-1960) for Carduus nutans, 27 years (1933-1960) for Euphorbia esula, 17 years (1938-1955) for Setaria faberii (see Jones & Fuller 1955, p. 79), and 2 years (1963-1965) for Naias minor.

Deletions from the published weed lists show that the duration of time that a plant can be a weed also varies. Examples of native plant deletions include in 1965 Naias flexilis, Potamogeton zosteriformis, P. gramineus, P. richardsonii and P. fresii; deleted in 1960 was Acalypha virginica and in 1981 was Acorus calamus and Cuscuta pentagonia. Alien weed deletions include in 1960 Tanacetum vulgare 114 years after its introduction and Tragopogon pratensis 69 years after its introduction. In 1981 Centaurea maculosa and Cucurbita foetidissima were deleted 36 and 64 years respectively after their first occurrence in the Illinois flora.

Every plant can under a given circumstance be considered a weed and thus the selection of plants to be included or excluded when preparing a list of weeds is necessarily an arbitrary decision. It is possible that a given species can simultaneously be both a weed and not a weed. It is well known that soybeans in a cornfield (or vice versa) are weeds for example (although soybeans or corn are not on the present-day weed list). Dandelions are not weeds when they are cultivated but are in lawns. Wax et al. (1981) gives another example using woody plants when on page 286 they state that a number of shrubs and trees often occur as brush in pastures and "under these conditions" are considered weeds. Weedy plants are often additionally characterized as for example as "not troublesome" (Wax et al. (1981) p. 189) or "minor" weeds (Wax et al. (1981) p. 274) the implications of these status modifiers not always being clear. When a previously uncultivated area of vegetated land is cleared and/or drained and prepared for crops all plants present would be weeds; so also would all plants on any area being plowed or cultivated as well as all plants sprayed with herbicides or otherwise controlled along highways, railroads and under utility lines.

Lists of weeds are generally as accurate as they can be perhaps but nevertheless need continual re-evaluation. There probably will always be disagreement about which plants are to be included as weeds. I would suggest especially that more thought be given to a species (particularly native ones) role in the flora and the ecosystem before it is given the label "weed" which usually subjects it to an extermination program. Also perhaps occurrence, frequency and distribution should be viewed more closely in the preparation of a weed list. For example, 33 (17 alien, 16 native) weeds in Illinois have a rare frequency of occurrence in the state in that each is in only 4% or less (i.e. 1-4) counties. Wax et al. (1981) indicate 4 Illinois weeds (3 alien, 1 native) on their distribution maps to be rare. The Illinois weed species also allows for the inclusion of 2 threatened and 9 endangered species listed in Bowles et al. (1981) as well as the state tree. It is interesting to note that three native species now on the state endangered list, Potamogeton gramineus, P. pulcher and P. vaseyi, (Bowles et al. (1981) were considered weeds in 1963 (Lopinot 1963) but not since 1965 (Lopinot 1965, 1968, 1971, 1976, 1979, 1981). One wonders what effect the designation weed, with the resulting "control" efforts, had on them attaining such a population level that they have attained endangered status in such a relatively short period of time. Since the 280 native plant weed species represent 14% of the present-day Illinois native vascular plants and 10% of the present-day Illinois spontaneous vascular flora, one also wonders about the danger to the existence of this part of the flora since being weeds they are the object of the "control" program. Wax et al. (1981)

includes Rorippa austriaca in the state (rarely) although it has as yet not been recorded for the state per Mohlenbrock (1980); likewise Reed (1970) includes Eichornia crassipes as a weed in Illinois but Mohlenbrock (1975) does not record it for the state.

In order to have a more judicious selection of weed plants I would like to recommend that published weed lists:

1. Always list specific epithets. Listing genera only, spp., other plants, similiar plants, etc, is unsatisfactory for accurate weed analysis, monitoring, evaluation or management purposes;
2. Account for the occurrence, frequency and distribution of the included plants particularly native species. Rare, threatened or endangered plants should not be included or should any species on the verge of becoming so;
3. Take into consideration the plants being an integral part of the flora and ecosystem, particularly native plants. Any weed management program should not be a detriment to or at the expense of the ecosystem, particularly of native vegetation. Weed selection should involve other criteria besides only being undesirable to man's present economy and desires;
4. State the definite threshold criteria used for a plant having attained weed status. Weeds should be objectively rather than subjectively selected;
5. Apply to smaller rather than larger areas. The list of weeds for many states is not as useful and accurate as one for one state or county.

Hopefully, this paper will cause its readers to use a more precise and considered judgement in the selection of weed plants. As the population grows more rapidly and moves to the open country and towards rural life-styles (Long and DeAre, 1982; Beller et al., 1982) in conjunction with continuing intensive agriculture we might expect as a result more plants categorized as "weeds" at the expense of the native (natural) flora and ecosystem for which amends and mitigations should be made.

SUMMARY

1. There are 442 weed species in the spontaneous Illinois vascular flora. These species represent about 16% of this flora. From 1803-1978 there were 2.5 weed species entering the flora per year.

2. Thirty-seven percent of the weed species are alien and 63% native.
3. Of the alien weed species 46% were once cultivated, 82% were introduced before 1922, and 83% are from the old world.
4. One percent of the weed species are pteridophytes, 2% gymnosperms and 97% angiosperms. They occur in 72 families the largest being the Compositae, Poaceae and Rosaceae. Eight families consist of 100% weed species.
5. The weed species are in 188 genera, 51 of which consist of 100% weed species.
6. The weed species are 26% woody and 74% herbaceous. Woody plants have only been weeds for the past 30 years.
7. Forty percent of the weed species are poisonous to humans and 13% to livestock.
8. Twenty-two percent of the weed species are drug plants.
9. Twelve percent of the weed species are aquatic and 88% terrestrial.
10. Of the weed species 30% are annual, 5% biennial and 65% perennial.
11. Sixty-eight percent of the weed species occur throughout the state while 19% occur in the northern two-thirds and 13% occur in the southern two-thirds of the state.
12. Of the weed species 7% are rare, 22% occasional, 23% often and 48% common in the state.
13. The length of time for a plant to become a weed varies from almost immediately to over a hundred years. The duration of time a plant is a weed also varies.
14. It is recommended that weed lists should be judiciously made using definable threshold criteria, that specific epithets always be given, that more importance be given to criteria as occurrence and distribution as well as being in a flora and ecosystem context, that areas for such lists be relatively smaller rather than larger and that the weed flora should be continually monitored and evaluated.
15. Perhaps there will be more weed species (possibly mostly aliens) in the flora in the future as land disturbance increases as the population increases in rural areas and

agricultural practices change and intensify. Unfortunately this trend will occur at the expense of the native (natural) flora and ecosystem.

LITERATURE CITED

- Batra, S.W.T. 1982. Biological Control in Agroecosystems. *Science* 215:134-139.
- Beller, A.H., Quinn, J.A. and Sofranko, A.J. 1982. Shifting Populations in Illinois. *Illinois Research* 24(3):14-16.
- Bowles, M.L., Diersing, V.E., Ebinger, J.E., and Schultz, H.C. 1981. Endangered and Threatened Vertebrate Animals and Vascular Plants of Illinois. Illinois Department of Conservation, Springfield.
- Boyer, J.S. 1982. Plant Productivity and Environment. *Science* 218:443-448.
- Buchholtz, K.P., Grigsby, B.H., Lee, O.C., Slife, F.W., Willard, C.J., and Volk, N.J., 1954. Weeds of the North Central States. Univ. of Illinois Agric. Expt. Station Circular 718, Urbana.
- Darlington, H.T. 1922. The Introduced Weed Flora of Illinois. *Trans. Ill. State Acad. Sci.* 15:171-184.
- Evers, R.A., and Link, R.P. 1972. Poisonous Plants of the Midwest and Their Effects on Livestock. Univ. of Illinois College of Agric. Special Publ. 24, Urbana-Champaign.
- Fermanian, T.W., Shurtleff, M.C. and Randell, T. 1982. 1982 Turfgrass Pest Control. Univ. of Illinois College of Agric. and Cooperative Extension Service Circular 1076, Urbana-Champaign.
- Flagg, W.C. and Burrill, T.J. 1878. Catalogue of the Flowering and Higher Flowerless Plants of Illinois: Native, Introduced and Cultivated. *Rept. Ill. Industrial. Univ.*, 9:219-287, 291-297.
- Froud-Williams, R.J., Chancellor, R.J. and Drennan, D.S.H. 1981. Potential Changes in Weed Floras Associated with Reduced-Cultivation Systems for Cereal Production in Temperate Regions. *Weed Res.* 21(2):99-109.
- Hardin, J.W. and Arena, J.M. 1974. Human Poisoning from Native and Cultivated Plants. 2nd ed. Duke Univ. Press, Durham, North Carolina.

- Henry, R.D. and Scott, A.R. 1981. Time of Introduction of the Alien Component of the Spontaneous Illinois Vascular Flora. *Amer. Midl. Nat.* 106:318-324.
- Holm, L. 1969. Weed Problems in Developing Countries. *Weed Sci.* 17:113-118.
- Holstun, J.T. Jr., Alex, J., Darrow, R.A., Erickson, L.S., Frank, P.A., Johnson, B.G., Miller, J.F., Robocker, W.C., Williams, J.L., and Scudder, W.T. 1971. Report-Subcommittee on Standardization of Common and Botanical Names of Weeds. *Weed Sci.* 19:435-476.
- Illinois Department of Agriculture. 1978. Illinois Noxious Weeds: Their Description and Control. Springfield.
- Jones, G.N. and Fuller, G.D. 1955. Vascular Plants of Illinois. Univ. of Ill. Press, Urbana, and Ill. State Museum, Springfield.
- Long, L. and DeAre, D. 1982. Repopulating the Countryside: A 1980 Census Trend. *Science* 217:1111-1116.
- Lopinot, A.C. 1963, 1965, 1968, 1971, 1976, 1979, 1981. Aquatic Weeds: Their Identification and Methods of Control. *Fishery Bull.* No. 4, Ill, Dept. of Conservation, Springfield.
- McWhorter, C.G. and Patterson, D.T. 1980. Ecological Factors Affecting Weed Competition in Soybeans. In: Corbin, F.T. ed., *World Soybean Research Conference II: Proceedings* pp. 371-392. Westview Press, Boulder, Colorado.
- Mead, S.B. 1846. Catalogue of Plants Growing Spontaneously in the State of Illinois, the Principal Part near Augusta, Hancock County. *Prairie Farmer* 6:35-36;60;93;119-122.
- Michaux, A. 1803. *Flora Boreali-Americana*. 2 vols. Paris. (1974 reprint by Hafner Press, New York).
- Mohlenbrock, R.H. 1975. Guide to the Vascular Flora of Illinois. Southern Illinois University Press, Carbondale.
- Mohlenbrock, R.H. 1980. The Illustrated Flora of Illinois-Flowering Plants: Willows to Mustards. Southern Illinois University Press, Carbondale.
- Mohlenbrock, R.H. and Ladd, D.M. 1978. Distribution of Illinois Vascular Plants. Southern Illinois University Press, Carbondale.

- Oldenstadt, D.L., Allan, R.E., Bruehl, G.W., Dillman, D.A., Michalson, E.L., Papendick, R.I. and Rydrych, D.J. 1982. Solutions to Environmental and Economic Problems (STEEP). Science 217:904-909.
- Reed, C.F. 1970. Selected Weeds of the United States. United States Dept. Agriculture, Agric. Handbook No. 366. Washington, D.C.
- Schmid, R. 1982. Descriptors Used to Indicate Abundance and Frequency in Ecology and Systematics. Taxon 31:89-94.
- Slife, F.W., Buchholtz, K.P. and Kommedahl, T. 1960. Weeds of the North Central States. Rev. ed. Univ. of Illinois Agric. Expt. Station Circ. 718, Urbana.
- Tehon, L.R. 1951. The Drug Plants of Illinois. Ill. Natural History Survey Circular 44, Urbana.
- Turgeon, A.J., Street, J.R., Giles, F.A., Shurtleff, M.C., and Randell, R. 1980. Illinois Lawn Care and Establishment. Univ. of Illinois College of Agric. and Cooperative Extension Service Circular 1082, Urbana-Champaign.
- Wax, L.M., Fawcett, R.S. and Isely, D. 1981. Weeds of the North Central States. Univ. of Illinois College of Agric. and Agric. Expt. Station Bulletin 772, Urbana-Champaign.
- Williams, M.C. 1980. Purposefully Introduced Plants that have Become Noxious or Poisonous Weeds. Weed Sci. 28:300-305.

ADDENDUM TO A REVISION OF CUPRESSUS L. (CUPRESSACEAE).

John Silba

198 W. Hoffman Ave., Lindenhurst, N.Y. 11757

It has been my privilege to study the Cupressus genus intensely since 1976. My life experience as a private collector and keen traveler has enabled me to devote a wealth of time studying one specific genus. After growing the more common species of cypress from seed indoors in New York I became quite interested in acquiring seed of the entire genus. Luckily I was fortunate enough to obtain both wild and cultivated seed of all the recognized taxa and synonyms listed in this paper from sources listed by myself in *Phytologia* 49: 420. 1981 and many other private contacts.

After raising several seed lots I began to appreciate the variability in each taxon and the relationships between each taxon. I then visited the University of Washington Arboretum in Seattle to study their cultivated cypresses in November 1979. Later I made frequent studies of herbarium material at the New York Botanical Garden in the Bronx. In November 1982 I published my revision of Cupressus in *Phytologia* 49: 390-399. I was content with my treatment of New World and Mediterranean taxa, but I was still somewhat puzzled as to the Asiatic species on the basis of limited herbarium material.

Then in 1982 I did a considerable amount of traveling to several herbaria and arboreta whom have noteworthy collections of Cupressus. In March 1982 I visited the Los Angeles State and County Arboretum in Arcadia, California. In April 1982 the Harvard University Herbaria in Cambridge (A & GH); in May 1982 the U.S. National Herbarium in Washington, D.C. (US); in July the Academy of Natural Sciences of Philadelphia (PH), and the Missouri Botanical Garden (MO) in Saint Louis during late July 1982. For ten days in November 1982 I went to the British Isles where I visited the Hillier Arboretum in Romsey, England; the Royal Botanic Gardens, Kew (K); the British Museum of Natural History in London (BM), and the Royal Botanic Garden in Edinburgh, Scotland (E). Finally I visited the Brooklyn Botanic Garden (BKL), New York in December 1982. I studied and photographed a numerous amount of herbarium specimens including type material. This list is too long for documentation here, however well over a hundred sheets bear my annotation labels of all the combined herbaria mentioned. After a thorough investigation I have now written this paper with total satisfaction of taxonomic treatments on my part and encouragements of others.

I have raised seedlings of all taxa listed in this paper. My observations reveal that all the New World taxa bear 3-4 acute cotyledons, whereas all the Old World taxa bear 2 obtusely pointed cotyledons (Silba, *Phytologia* 49: 390-399.1981 & *Phytologia* 51:157-160. 1982). This undoubtedly proves that the cultivated trees of *C. lusitanica* in Portugal came from the New World. While the number of cotyledons per group is relatively constant I do not think this feature alone is enough to divide the genus into two subsections. Everthough the Old World species have non-fragrant foliage, whereas the New World species have fragrant foliage, this feature varies considerably from seed origin and is open to debate. I have been encouraged by several botanists to produce a taxonomic key. The one listed here is largely based on vegetative rather than coning characteristics. Cones are not always born on cultivated trees until they are quite old.

As of this writing I have accepted 13 species (including type varieties) and 12 varieties compromising the genus *Cupressus*. Below is a list of accepted names with their principal synonyms in brackets and their chief distribution. I have retained the number of New World and Mediterranean taxa recognized in my original revision (*Phytologia* 49, 1981), however additional research has led to the reduction of names of Asiatic taxa.

LIST OF ACCEPTED TAXA

1. *Cupressus arizonica* Greene
 - a) var. *arizonica* (typical)- sw. Arizona & northern Mexico (Chihuahua to San Luis Potosi).
 - b) var. *glabra* (Sudw.) Little [*C. glabra* Sudworth] central Arizona (Coconino to Gila Co.).
 - c) var. *montana* (Wigg.) Little [*C. montana* Wigg.]. San Pedro Martir, Baja CA, Mexico.
 - d) var. *nevadensis* (Abrams) Little [*C. nevadensis* Abrams] - Piute Mts., Kern & Tulare Co., CA.
 - e) var. *revealiana* Silba- Named after Jack L. Reveal (SD)- Sierra Juarez, Baja CA, Mexico.
 - f) var. *stephensonii* (Wolf) Little [*C. stephensonii* Wolf]- Cuyamaca Mts., San Diego Co., CA.
2. *C. bakeri* Jeps. [*C. bakeri* subsp. *matthewsii* Wolf] Siskiyou Mts., OR to Plumas Co., Calif..
3. *C. chengiana* Hu [*C. jiangeensis* Zhao] Min River, nw. Szechuan & s.w. Kansu, China.
4. *C. duclouxiana* Hickel- Pome, Tibet to Kunming, Yunnan.
5. *C. gigantea* Cheng & Fu, Tsangpo River, Tibet, China.
6. *C. goveniana* Gord.
 - a) var. *goveniana* (typical)- Monterey Co., CA.

- b) var. abramsiana (Wolf) Little [C. abramsiana Wolf]- Santa Cruz Mts., Santa Cruz Co., CA.
- c) var. pygmaea Lemm. [C. pygmaea (Lemm.) Sarg.] Mendocino County, California.
- 7. C. guadalupensis Wats.
 - a) var. guadalupensis (typical)-Guadalupe Isld., Mexico.
 - b) var. forbesii (Jeps.) Little [C. forbesii Jeps.]- sw. Calif. & nw. Baja Calif., Mexico.
- 8. C. lusitanica Mill. [C. lindleyi Klotzsch, C. Cornuana Carr.]
 - a) var. lusitanica- Durango, Mexico to Honduras.
 - b) var. benthamii (Endl.) Carr. [C. benthamii Endl.] Hidalgo; Vera Cruz & Puebla, Mexico
- 9. C. macnabiana Murr.- Sierra Nevada, California.
- 10. C. macrocarpa Hartw.- Monterey Co., CA.
- 11. C. sargentii Jeps.- California Coast Ranges.
- 12. C. sempervirens L.
 - a) var. sempervirens [C. horizontalis Mill; C. sempervirens var. numidica Trab.] Greece to Iran.
 - b) var. atlantica (Gausson) Silba [C. atlantica Gausson]- Oued N'Fis, Morocco.
 - c) var. dupreziana (Camus) Silba [C. dupreziana Camus]- Tassile Mts., sw. Algeria.
- 13. C. torulosa Don.
 - a) var. torulosa- nw. India & nw. Nepal.
 - b) var. cashmeriana (Royle) Kent ["Kashmeriana"; C. cashmeriana Royle ex Carr.] Pho Chu Valley, Bhutan.

CUPRESSUS Linn., Gen. Pl. 294. 1737

Evergreen trees 10-60 m. tall, columnar or conical in habit with ascending branches. Branchlets are usually more or less evenly disposed around the branches and are either cylindrical or quadrangular. The evergreen foliage is the same color on top and bottom, whereas Chamaecyparis leaves are usually paler or whitish beneath. The leaves are scale-like, 1-3 mm. long, usually closely appressed to the twig, opposite, decussate, triangular, bluntly acute and ridged on back. Each leaf may be furnished with a gland which may be inconspicuous or actively secreting resin. Male and female cones are borne on the same tree, but on separate branchlets. Male cones are produced on the ends of short branchlets, are cylindrical to oblong, 3-7 mm. long, green or red eventually turning yellow. Each scale bears 2-6 anthers. The pollen granules are rounded, 27-38 microns in diameter. The female cones are red brown to gray, woody, maturing in 2 years, they usually remain closed on the branches for a

considerable time thereafter. The cones vary in length from 2-4 cm. long, are globose to ovoid and have 4-14 distichuously arranged peltate scales. Each scale bears an umbo which may be dull or sharp pointed. Seeds are irregularly oval to round, often over 100 per cone or 10-20 per scale, measuring 3-6 mm. broad. Wings equal in size on both sides of the nut, small, 1-2 mm. broad. Seedlings bear 2-6 bluntly acute cotyledons, 8-15 mm..

Type Species: Cupressus sempervirens L., Sp. Pl. 1002. 1753. Originally described from Crete. A native of the eastern Mediterranean countries from Greece to Iran and widely cultivated in mild climates.

KEY TO THE SPECIES OF CUPRESSUS

1. Branchlets more or less evenly disposed around the branches, recalling Juniperus.
2. Bark exfoliating in thin, non-fibrous, dark red scaly plates.
 3. Foliage faintly scented, gray to bluish green. Leaves acute, glands usually not secreting resin. - - - 7. C. guadalupensis.
 3. Foliage appreciably scented, grayish green. Leaves sharply acute, glands usually actively secreting resin. - - - 2. C. bakeri.
2. Bark stripping vertically between fine fissures.
 3. Branchlets divided into thin thread-like segments. Leaves narrowly acute, green to blue green, grooved on back, glands apparent, but obscure. - - - 4. C. duclouxiana.
 3. Vigorous branchlets often in a fishbone pattern. Leaves broad-ovate, obtuse, grooved on back, gray green, distinctly glandular. - - - - - 3. C. chengiana.
 3. Branchlets comparatively robust, densely arranged in rows. Leaves rhomboidal with an expanded apex, acutish, gray green, bloomed white, distinctly glandular. - - - - - 5. C. gigantea.
2. Bark thick, gray brown, fibrous, furrowed longitudinally.
 3. Leaves acute, green to gray green, glands inconspicuous.
 4. Foliage dark green, leaves not grooved on back, glands never active, noticeable scent. - - - - - 6. C. goveniana
 4. Foliage pale green, leaves sharply acute, grooved on dorsal side, glands relatively inactive. - - - - - 1. C. arizonica
 4. Foliage gray green with a glaucous bloom, bluntly acute, leaves not grooved on back, gland seldom active. - 11. C. sargentii.

- 3. Leaves obtuse, dark green, glands obscure.
- 4. Foliage has a citrus scent. Leaves not grooved on back, glands do not exude resin. - - - - - 10. C. macrocarpa
- 4. Foliage almost scentless. Leaves grooved on back, glands seldom secreting resin, dull green. - - - 12. C. sempervirens
- 1. Branchlets flattened in small sprays, recalling Chamaecyparis.
- 2. Bark exfoliating in thin, long strips.
 - 3. Leaves bright green, bluntly acute, glands inconspicuous. Crushed foliage has a faint resinous or grass-like scent. - 13. C. torulosa.
 - 4. Leaves gray green, grooved on back, sharply acute with a prickly apex, glands inconspicuous. Foliage has a faint citrus aroma. - - - - - 8. C. lusitanica Mill.
- 2. Bark thick, fibrous, furrowed longitudinally.
 - 3. Leaves bluntly acute, ovate, dark green, distinctly glandular. Foliage quite heavily scented of citrus. - - - 9. C. macnabiana.

KEY TO THE INFRASPECIFIC VARIETIES OF CUPRESSUS

- 1. Leaves sharply acute, gray green, glands apparent and may be active. - - - C. arizonica complex.
- 2. Bark fibrous, furrowed longitudinally, gray.
 - 3. Leaves dark gray green, glands often actively secreting resin which leaves a white dot. Seeds flattened. - var. montana
 - 3. Leaves light gray green, glands active leaving a clear or reddish resin. Seeds rounded. - - - - - var. nevadensis.
- 2. Bark breaking into thin, non-curling plates, dark red.
 - 3. Leaves light gray green, glands seldom secreting resin. - - - var. stephensonii
 - 3. Leaves blue gray, much white spotted due to active glands. - - - - - var. glabra.
 - 3. Leaves gray green, sparsely white spotted, glands often secreting resin. Bark only partially exfoliating. - - var. reveliana.
- 1. Leaves green to dark green, bluntly acute, glands inconspicuous. - - - - C. goveniana complex.
- 2. Leaves dull, blackish green. Seeds shiny black, warty. - - - - - var. pigmaea.
- 2. Leaves bright light green. Shoots often exhibit rapid growth. Seeds brown, often glaucous, rarely warty. - - var. abramsiana
- 1. Leaves bright green, sharply acute, fragrant, glands generally absent. - - C. guadalupensis var. forbesii.

1. Leaves obtuse, dark green, glands apparent and sometimes excluding resin. - C. sempervirens complex.
2. Branchlets in short flattened sprays. Foliage sometimes aromatic. Leaves bearing active glands on young trees. Female cones ovoid with 10-12 scales. Seeds with large wings. var. dupreziana.
2. Branchlets in flat sprays. Foliage with faint resinous scent. Leaf glands active in young trees. Female cones globose, with usually 8 scales. - - - - - var. atlantica.
1. Leaves sharply acute, glands inconspicuous and rarely active. Foliage faintly scented.
2. Branchlets in short flattened, fern-like sprays. Leaves pale green, apex sharp-pointed, glands abundant on young plants. - - - C. lusitanica var. benthamii.
2. Branchlets in long, pendulous, chain-like segments. Foliage a silvery blue. Leaves in juvenile state. - - - C. torulosa var. cashmeriana.

GENERIC CONCEPTS

The conservative treatment of the New World cypresses by Little (Phytologia 20:429-445. 1970) seems to be gaining recognition in the United States and France. A recent textbook by T. Elias (Trees of N. Amer. 1980) has followed his treatment. As well as Y. Birot in a bulletin of the Comunita Economica Europea (Nov. 1979 Seminary:69-78) and P. Allemand (Com. Econ. Eur., Nov. 1979 Seminary: 51-67). A noted Gymnosperm specialist Dr. Thomas Zanoni, formerly with the New York Botanical Garden (NY) and now working in the Dominican Republic, had annotated the Cupressus specimens at NY in accordance with this treatment. Also, Johnson (USDA Agr. Handb. 450:363-369. 1974) accepted the treatment of Little (1970).

The Cupressus arizonica complex includes six varieties based on vegetative differences and geographic distribution. Wolf (Aliso 1:5. 1948) admitted that all these taxa were closely related and may one day be recognized as infraspecific varieties.

Distribution maps of other United States Gymnosperms by Little (Atlas of US. Trees, 1, 1971) shows that Abies concolor Hildebr. has a similar distribution, but only one variety besides the type is distinguished. Munz (Calif. Flora. 1959) lists many species of Angiosperm genera that have five varieties in California alone. Particularly Rhamnus californica Esch. which has five geographic varieties that were once viewed as separate species. Rhamnus californica also

has a similar distribution in California, Baja California, and in Arizona like Cupressus arizonica.

The varieties of C. arizonica can be divided into two groups, one with furrowed bark and one with scaly bark according to my key. Similarly Pinus contorta Dougl. has furrowed bark, while a geographical variety, var. latifolia Engelm. has scaly bark. Three or more varieties of P. contorta are recognized, the type occurs on the California Coast, var. murrayana Engelm. occurs in central California and northern Baja California, while var. latifolia occurs in the Rocky Mts., Colorado.

The C. arizonica group bears a relationship to C. bakeri, C. lusitanica and shows parallel features with C. chengiana and C. gigantea in bark and leaf glands.

Cupressus bakeri subsp. matthewsii Wolf was reduced to synonymy with the type by Little (1970) and has also not received general acceptance in the literature. For horticultural purposes it may be retained as a cultivar since it is faster-growing than the type. Additional populations of C. bakeri were reported by Griffin & Critchfield (Distr. For. Tr. in Calif. 1976) that Wolf (Aliso 1:72.1948) was unaware of. These populations included intermediate forms between Wolf's two subspecies of C. bakeri.

The three Chinese cypresses C. chengiana, C. duclouxiana and C. gigantea are not well known and have led to confusion in the literature with C. torulosa. I reduced C. jiangensis Zhao to synonymy with C. chengiana in Phytologia 51:157-160 because of the lack of botanical features and distribution distinguishing the two. Cupressus duclouxiana resembles C. sempervirens and shows parallel features with C. goveniana and C. macrocarpa in its obscurely glandular leaves and large cones, but its foliage is nearly scentless.

The C. goveniana complex has three varieties based on size of cones and color of foliage and seeds. As pointed out by Little (1970) Pinus contorta shows a similar distribution. A variation, P. contorta var. bolanderi Vasey occurs in the Pine Barrens of Mendocino County as does C. goveniana var. pigmaea. Fossil remains studied by Axelrod (Madrono 29:127-147. 1982) shows that C. goveniana and C. macrocarpa once had a larger distribution to the north and south of their current populations. Changing environmental factors made them retreat to the California Coast in search of warmer climates. The question arises as to why would one reduce taxa of Cupressus that have small populations to varietal rank and then leave C. macrocarpa as a species. A similar instance is

noted in Abies bracteata Don which is restricted to the Santa Lucia Mts., Monterey Co., California. The reason Abies bracteata and Cupressus macrocarpa are distinguished as species from other members of their genus is because of outstanding differences in bark, leaves and cones. Cupressus sargentii is widely distributed in California and shows botanical affinities to C. goveniana. Cupressus goveniana var. abramsiana is intermediate in chemical characters between C. goveniana and C. sargentii (Zavarin, Phytochem. 6:1387-1394. 1967).

Cupressus guadalupensis may be a descendant of C. macrocarpa and shows parallel bark features with C. arizonica var. glabra and C. bakeri, but is not closely related to those species. Cupressus guadalupensis var. forbesii occurs on the California mainland while the type is confined to Guadalupe Island. Similarly Pinus radiata Don occurs on the California mainland, while a variety, P. radiata var. binata Lemm. occurs on Guadalupe Island, Mexico.

Cupressus lusitanica is a highly variable tree in the wild and in cultivation. It is naturalized in Central America, Portugal and perhaps India. Cupressus lusitanica is widespread throughout Mexico to Honduras. As such it is obviously the ancestor of var. benthhamii, formerly recognized as a separate species and restricted to three states in northeast Mexico. Cupressus lusitanica exhibits parallel features with C. sempervirens and C. torulosa in that they all have inconspicuous leaf glands and varieties with flattened branchlets. Cupressus macnabiana also has flattened branchlets and exhibits parallel development with these three species.

Because of its widespread distribution and gray green foliage with inconspicuous glands C. lusitanica may be the ancient ancestor of all the New World cypresses. Possey and Goggans (Auburn Univ. Agric. Exp. Sta. Cir. 160, 23 p., 1968) suggested that there may have once been one widespread species throughout the southwest. In reviewing the entire genus it must be noted that many taxa are represented by small populations. This is due in part to geographic isolation caused by natural disasters including man, fires and climatic changes.

Controversy has arisen as to which of the two forms of C. sempervirens, known as horizontalis and 'stricta' was described by Linnaeus (Sp. Pl. 1002. 1753). Examination of that text reveals that Linnaeus described the plant from Crete where the horizontal form is endemic. Perhaps



Fig. 1. Cupressus sempervirens var. dupreziana on left, Leredde 800, Tamrit, Algeria, 1700 m., 23-5-1949; Cupressus sempervirens on right, Holotype- Linneaus s.n., Isle of Crete, ca.1753 in Hortus Cissus Cliffortianus [(BM) both var.].

Linnaeus viewed the horizontal form and the 'stricta' form as separate sexes of the same plant. Nevertheless, 'stricta' does not always come true to seed and is not known in the wild (Mitchell, Conif. Brit. Isles. 1975). Therefore since the horizontal kind was referred to by Linnaeus it should be recognized as the type, whereas 'stricta' should be retained as a cultivar.

I reduced C. sempervirens var. numidica Trab (Bull. Soc. Hort. Tunisia et Rev. Hort. Algerie. 17:309.1913) on the basis that it only differs from the type in its upright branches leaving the trunk at right angles. Whether this feature is constant throughout the population in central Tunisia is open to debate. This taxon was not recognized by Barry (Soc. Hist. Natur. Afr. Nord. Bull. 61:95-196. 1970). However, for horticultural reasons it may be retained as a cultivar.

Cupressus torulosa has parallel affinities with C. lusitanica, C. macnabiana and is perhaps related to C. chengiana and C. gigantea.

The plant cultivated in Europe as C. torulosa var. corneyana was originally described in my opinion from cultivated trees of C. lusitanica in India. Mitchell (Trees of Britain. 1974) describes this variety with twisted branchlets and yellowish green foliage. This is not at all similar to the specimens collected in Bhutan by Griffith and Cooper that have flattened branchlets in long pendulous chains. I raised seed of C. torulosa corneyana in 1978 from the Station de Botanique et de Pathologie Vegetale, Antibes, France. This lot bore seedlings with 3-5 bluntly acute cotyledons over 12 mm. long which well agreed with C. lusitanica seedlings raised from Portugal in 1982 from the University of Lisboa. I had sown seeds of C. torulosa from Schilling 2412 (BM) from central Nepal which bore 2 obtusely pointed cotyledons under 10 mm. long very similar to those I raised as C. cashmeriana in 1977 from the Les Cedres Botanical Garden, Saint-Jean-Cap-Ferrat, France.

Franco (Portug. Acta Biol. Ser. B. 9: 183-195. 1969) apparently viewed corneyana and cashmeriana as synonymous with each other on the basis of one incorrectly labeled herbarium specimen [C. corneyana Gordon, Gordon s.n., Knight Nursery, England, ca.1847 (K)] and no comparison of living plants. A specimen labeled C. corneyana collected by Shuttleworth s.n., Hort. Huber Hyeris, England, 23-12-1862 (K) has branchlets evenly disposed around the twig, adult leaves with a spiny apex and cones with prominent umbos typical of C. lusitanica, Moller 214, 3-1887, Bussaco, Portugal. The plant listed by Hillier (Man. Trees & Shrubs. 1978) as C. torulosa var. corneyana



Fig. 2. Cupressus torulosa var. cashmeriana (top left); C. semper-virens var. dupreziana (bottom left); C. arizonica var. revealiana [drawing by Bobbi Angel (NY) top right]; C. arizonica var. revealiana (bottom left); all specimens at NY-cone draw.

is comparable to their C. lusitanica 'flagellifera' which bears large cones that are not conspicuously glaucous as in the type. In conclusion I herewith reduce C. corneyana Carr. to synonymy with C. lusitanica, however it may be retained as a cultivar under the latter species for horticultural purposes.

In my revision of Cupressus (Phytologia 49. 1981) I reduced C. cashmeriana as a cultivar of C. torulosa because both taxa have thin shreddy bark, reddish cones with 10-12 scales, non-glandular leaves with pale margins and seedlings with 2 obtuse cotylens 8 mm. long. Also because it was not known wild. However, examination at Kew of Henry s.n., 3-9-1909, Isola Madre, Italy well agrees with Cooper 3886, 11-5-1815 from Cholimarphe Thimpu, 7500 ft., Bhutan (E). Both specimens have long, pendulous flattened branchlets, though the individual color varies this is not an important feature. These specimens agree with those described wild in Bhutan by Long (Notes R.B.G. Edinb. 38: 311-314. 1980). Since it is now known wild I am recognizing this taxon as C. torulosa var. cashmeriana (Royle ex Carr.) Kent (Veitch. Man. Conif. 2: 284. 1900. "Kashmeriana").

The status of Chamaecyparis funebris (Endl.) Franco (Agros 24: 93. 1941) seems to be gaining recognition in the United States. It was accepted by Bailey (Hortus Third. 1977), Moore (Baileya 14: 4-5. 1966) and Mulligan (Intern. Dendrol. Soc. Yrbk 1975: 14-24. 1976). Mitchell (Conif. Brit. Isls. 1975) refers to it under Cupressus, however he compares it to Chamaecyparis lawsoniana Parl. because both taxa have flattened branchlets and leaves with translucent glands. Its small cones that open upon maturity are also characteristic of Chamaecyparis Spach. and therefore C. funebris should be classified in that genus. Chamaecyparis funebris grows fairly close to populations of Cupressus chengiana in Szechuan, China. It may be possible that there will arise bigeneric hybrids in future generations.

In my revision of Cupressus (Phytologia 49. 1981) I had recognized that to the best of my knowledge only two species of the genus hybridize in the wild. These are C. arizonica x C. lusitanica in northwest Durango, Mexico and C. macnabiana x C. sargentii in Lake Co., California. There are already other hybrids of the genus in cultivation, including a C. lusitanica x C. macrocarpa (Hillier, 1978). I do not think it is necessary to give all these hybrids formal Latin names which may result in confusion with recognized species. They are best left with two names indicating that they are indeed hybrids.

ARBORETA WITH NOTABLE COLLECTIONS

In addition to those cited in Phytologia 49: 419. 1981. the following arboreta have a fairly comprehensive collection of cypresses;

Botanic Garden, North Terrace, Adelaide, South Australia 5000, Australia. Most species represented.

National Botanic Gardens, Glasnevin, Dublin 9, Ireland. Most species represented.

I.N.R.A., Centre de Recherches Forestiers, Station d'Amelioration des Arbres Forestiers, Ardon 45160, Olivet, France. Most species represented.

Instituto di Botanica Agraria e Forestale, Firenze (Florence), Italy. Most species represented.

Westonbirt Arboretum, Tetbury, Gloucestershire, GL8 8Q5, England, U.K.. Good variety of kinds.

Eddy Arboretum, Institute of Forest Genetics, 2480 Carson Road, Placerville, California, 95667, U.S.A. American and Mediterranean kinds represented.

Los Angeles State and County Arboretum, 301 North Baldwin Ave., Arcadia, CA 91006 U.S.A. Good variety of kinds represented.

Rancho Santa Ana Botanic Garden, 1500 North College Ave., Claremont, CA 91711, U.S.A.. California taxa.

Santa Barbara Botanic Garden, 1212 Mission Canyon Road, Santa Barbara, CA 93105, U.S.A. California kinds represented.

UCR Botanic Gardens, University of California, Department of Botany & Plant Sciences, Riverside, CA 92521 U.S.A. Most kinds represented.

Botanical Garden, University of California, Centennial Drive, Berkeley, CA 94720, U.S.A. Cupressus gigantea represented.

University of Washington Arboretum, Seattle, Washington 98195. Good variety of species represented.

Borde Hill Garden, Haywards Heath, West Sussex, RH16 1XP, England, U.K. Comprehensive collection.

A NOTE ON THE GYNOECEIUM OF CRATAEGUS AND
OF PUNICA (PUNICACEAE)

K. N. Gandhi and R. Dale Thomas, Department of Biology,
Northeast Louisiana University, Monroe, La. 71209.

In Angiosperms if the evolution of gynoeceium is traced from Magnolian stock, then the suppression of the elongated receptacle (also called the gynophore or torus) could have changed the spiral arrangement of carpels to a cyclic one. This kind of reduction was necessary for the coalescence of the lateral sides of adjacent carpels during the evolution from apocarpy to syncarpy. The appearance of the hypanthium made possible the adnation of the ovary with it and resulted in the development of epigyny from hypogyny. The coalescence of the carpels might have been centripetal or centrifugal or both, but was most likely centrifugal.

The taxa of Rosaceae are known for their diversity in the nature and position of carpels, ranging from apocarpy to syncarpy and from hypogyny to epigyny. The subfamily Pomoideae includes taxa such as Crataegus, Malus and Pyrus which are characterized with inferior ovaries. In Crataegus the ovary is five-carpellary and each carpel encloses two ovules. The five styles are free and the five carpels are adnate with the hypanthium along their dorsal surfaces. The lateral surfaces of the carpels are incompletely fused and their ventral margins are free from each other. This arrangement is quite unusual in Angiosperms since the ovary is inferior but incompletely syncarpous (see Figure 1). The free inner (ventral margins of the carpels suggest that the coalescence had commenced centripetally. Although this kind of parasyncarpous nature is believed to be secondary in a few taxa such as Apocynaceae, Asclepiadaceae, Lamiaceae, etc., it is primary in Crataegus since Rosaceae contains many genera with apocarpous gynoecia.

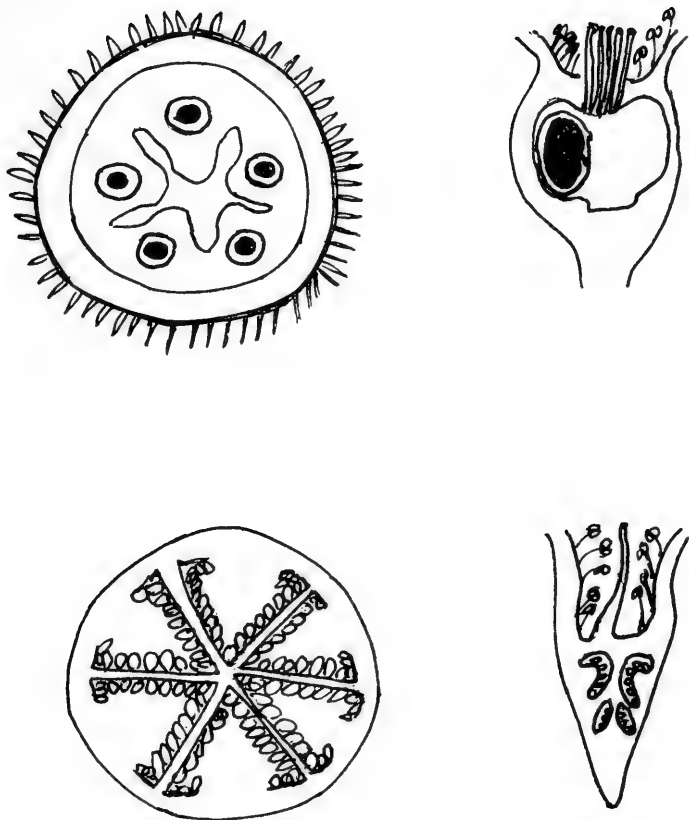


FIGURE 1. Gynoecia of Crataegus (at top) and Punica (bottom).

In Punica granatum the flower is epigynous. The gynoecium possesses many carpels that are adnate to the hypanthium. The arrangement of the carpels is quite unique. A few of the carpels are cyclic at the base with axile placentation and the remaining ones are superposed with intruding marginal placentation. Since some of the ovaries are free from each other and a few of the carpels are partly united, the number of ovaries is more than one. Thus the gynoecium has a compound ovary at the base and a few free ovaries upward.

It appears that in Crataegus and in Punica the adnation of the ovaries with the hypanthia resulting in epigyny had preceeded the development of syncarpy. This process illustrates the evolutionary concept iterated by Hutchinson and others that different organs of a plant can evolve at different rates.

A NOTE ON THE ODD PETAL IN ANGIOSPERMS

K. N. Gandhi and R. Dale Thomas, Department of Biology,
Northeast Louisiana University, Monroe, La. 71209.

Flowers of the Dicotyledons are generally 5-merous and those of the Monocotyledons are 3-merous. In the Dicotyledons, the common arrangement of petals is in such a way that the odd petal is anterior in position and the remaining four petals form two lateral pairs. The reverse of this arrangement is seen in a few groups of Dicotyledons such as the Fabaceae and the Malvales and so on. In these taxa the odd petal is posterior in position. The significance of this reversal of arrangement of the odd petal is not understood. However, the odd petal in Fabaceae, which is called the vexillum or standard, is the most attractive part of the flower and is the most significant of the five petals in attracting insect pollinators.

In most of the Monocotyledons, the odd petal is posterior in position and this arrangement is one of the striking differences between Monocotyledons and Dicotyledons. The reason for the posterior position of the odd petal in the Monocotyledons is mysterious since the odd petal generally is identical in form with the other two petals. It is a known fact that monocotyledonous taxa at the family level are well defined with no interemediate forms. However the Dicotyledons have many intergrading groups such as the Verbenaceae, Lamiaceae and Boraginaceae complex, the Magnolian complex, and so on. The occurrence of posterior odd petals in most of the families of the Monocotyledons is very significant in tracing the inter-relationships of the families. Orchidaceae is a noted exception to the posterior arrangement of the odd petal in Monocotyledons. In this family, the odd petal is called the labellum and is the most attractive part of the flower. As the

labellum is initiated, it is posterior in position in the developing bud, but it becomes anterior in position due to the twisting of the ovary by 180° during the development of the bud. Since the labellum in the Zingiberales group is of staminal origin, it is not homologous to the orchidaceous labellum.

The family Orchidaceae and the family Asclepiadaceae are generally compared because of the presence of pollinia and gynostegia in both families. This condition is considered to be an example of parallel evolution that has taken place in Monocotyledons and Dicotyledons. The role played by the vexillum (Fabaceae) and the labellum (Orchidaceae) in promoting entomophily may also be compared as to the unusual positions occupied by the vexillum (posterior) and the labellum (anterior) for their respective classes. This similarity in function is very striking since the Orchidaceae represents the culmination of lines of evolution in the Monocotyledons, but the Fabaceae occupies only the middle position in the evolutionary trends of Dicotyledons. The occurrence of the posterior odd petal in most of the monocotyledonous taxa and also in the Fabaceae and the Malvales can only be accounted for as another example of parallel evolution since the Monocotyledons are not directly linked to these two dicotyledonous taxa.

NOMENCLATURAL NOTES IN SPIRANTHINAE (ORCHIDACEAE)

Pamela Burns-Balogh

The following new sections were not validated in Balogh (1982).

1. Deiregyne sect. Pyramidales Balogh sect. nov.
T- Spiranthes pyramidalis Lindley
Labellum breve ovatum vel oblongum glandibus nectararii in marginis basilaribus labelli omnino adnatis. [Labellum short, ovate to oblong; nectar glands attached to base of labellum.]
2. Sarcoglottis sect. Aphylla Balogh sect. nov.
T- Pelexia aphylla Ridley
Folia in anthesis absentia. [Leaves absent at flowering.]
3. Sarcoglottis sect. Potosia (Schlechter) Balogh comb. nov. Pelexia sect. Potosia Schlechter, Beih. bot. Centralbl. 37:399 (1920). LT-
Spiranthes schaffneri Rchb. f.
4. Schiedeella sect. Eriophora Balogh sect. nov.
T- Spiranthes eriophora Robinson & Greenman
Bracteae scaposae scariosae; labellum panduriforme; rostellum elongatum; folia in anthesis absentia lanceolata sessilia. [Bracts scarious; labellum pandurate; rostellum elongate; leaves absent at flowering, lanceolate, sessile.]
5. Schiedeella sect. Eriophora subsection Chloraeiformes subsect. nov.
T- Spiranthes chloraeiformis A. Rich. & Gal.
Sepala recurvata; labellum inferne aurantiace vel viriter maculatum; flores in nervis virides. [Sepals recurved; labellum with orange or green throat markings; flowers green-nerved.]
6. Schiedeella sect. Parasitica Balogh sect. nov.
T- Spiranthes parasitica A. Rich. & Gal.
Bracteae herbaceae; rostellum breve; labellum oblongum inferne rubra maculatum; folia elliptica vel ovata petiolata. [Bracts herbaceous; rostellum short; labellum oblong with red throat markings; leaves elliptic-ovate, petiolate.]
7. Schiedeella sect. Michuacana Balogh sect. nov.
T- Neottia michuacana Llave & Lex.
Bracteae herbaceae in parte scariosae; rostellum elongatum; labellum ovatum inferne luteo-viriter maculatum; folia lanceolata sessilia. [Bracts herbaceous, partly dry; rostellum long; labellum ovate with yellow-green throat markings; leaves lanceolate, sessile.]

8. Stenorrhynchos sect. Cogniauxiocharis (Schlechter) Balogh comb. nov. Pelexia sect. Cogniauxiocharis Schlechter, Beih. bot. Centralbl. 37:412 (1920). LT- Pelexia glazioviana Cogn.
9. Stenorrhynchos sect. Stenorrhynchos subsect. Stenorrhynchos.
T- Serapias speciosus Gmelin.
10. Stenorrhynchos sect. Stenorrhynchos subsect. Paraguayenses Balogh subsect. nov.
T- Spiranthes paraguayensis Rchb. f.
Flores breves ovoides; rostellum elongatum inferne lateraliter alatum. [Flowers short, ovoid; rostellum elongate, with lateral wings.]

Balogh, P. 1982. Generic redefinition in subtribe Spiranthinae. Amer. J. Bot. 69:1119-1132.

Acknowledgments- I thank Jim Reveal for his advice and Harold Robinson for help in the Latin translation.

947
52
6

PHYTOLOGIA

An international journal to expedite botanical and phytoecological publication

Vol. 52

March 1983

No. 6

FIFTIETH JUBILEE YEAR

CONTENTS

TURNER, B. L., <i>New taxa of Tradescantia from northcentral Mexico</i>	369
HUTCHISON, P. C., <i>Orthophytum gurkenii</i> , sp. nov. (Bromeliaceae)	373
GANDHI, K. N., & THOMAS, R. D., <i>A note on the classification of fruits</i>	376
GANDHI, K. N., & THOMAS, R. D., <i>Placentation in Bignoniaceae as illustrated by Catalpa, Millingtonia, Kigelia, and Eccremocarpus</i>	377
RABELER, R. K., <i>A reorganized contributors' index to the National List of Scientific Plant Names</i>	379
ABALO, J. E., & MORALES L., G., <i>Doce (12) heliconias nuevas del Ecuador</i>	387
MOLDENKE, H. N., <i>Notes on new noteworthy plants. CLXIV.</i> . . .	414
MOLDENKE, H. N., <i>Notes on the genus Caryopteris (Verbenaceae)</i>	415
MOLDENKE, A. L., <i>Book reviews</i>	438

Published by Harold N. Moldenke and Alma L. Moldenke

303 Parkside Road
Plainfield, New Jersey 07060
U.S.A.

MAR 11 1983

NEW YORK

BOTANICAL GARDEN

Price of this number \$3.00; for this volume \$13.00 in advance or \$14.00 after close of the volume; \$5.00 extra to all foreign addresses and domestic dealers; 512 pages constitute a complete volume; claims for numbers lost in the mails must be made immediately after receipt of the next following number for free replacement; back volume prices apply if payment is received after a volume is closed.



NEW TAXA OF TRADESCANTIA FROM NORTHCENTRAL MEXICO

B. L. Turner

Department of Botany, University of Texas Austin, Texas 78712

Routine efforts to identify collections of the family Commelinaceae from the Chihuahuan Desert regions of northcentral Mexico have revealed two previously undescribed taxa, Tradescantia gypsophila and T. wrightii var. glandulopubescens, as noted below.

Tradescantia gypsophila B. L. Turner, sp. nov.

T. wrightii accendens sed habitu robustiore, foliis amplioribus, floribus multioribus, praeter ovarium perfecte glabris.

Perennial herbs 10-30 cm tall, glabrous throughout (except for the ovary). Roots fleshy, 2-4 mm thick, conspicuously pubescent, arising from short, stout, rhizomes. Leaves sedge-like, up to 15 cm long, mostly erect, reportedly "grey-green" when fresh; the lower most much-reduced, persistent as an aggregation of brown, scarious, tufted, sheaths; nodes and sheaths scarcely, if at all, inflated, the mid-stem blades linear-lanceolate, strongly plicate, 6-10 mm wide. Spathes leaf-like, 2-10 cm long. Inflorescences predominantly terminal on peduncles 2-10 cm long. Flowers reportedly "maroon to rose-red" or "purple-violet", (6)30-40 per primary inflorescence. Pedicels glabrous, up to 30 mm long, reflexed and twisting with age. Sepals narrowly triangular, 6-8 mm long, 2.5-3.0 mm wide, glabrous, translucent or scarious, with a faint mid-rib. Petals 7-10 mm long, ca. 5 mm broad, widest at the middle. Stamens ca. 6 mm long; anthers ca. 1.5 mm wide, the connective yellow, ca. 0.8 mm wide; filaments ca. 4 mm long, pubescent with white, multiseptate, hairs ca. 1 mm long. Ovary ca. 1.1 mm long, very sparsely pubescent with scattered, short, glandular trichomes; carpels 3, each with 2 ovules; style ca. 3.1 mm long, the stigma capitate. Seeds oval, grey, ca. 3 mm long, the funicular scar ca. 1/2 the length of the seed.

TYPE: MEXICO. Coahuila: ca. 32 (air) mi NE of San Pedro, 1 mi SW of Las Delicias at spring on limestone cliffs (26°14'N x 102°49'W), 3560 ft, 27 Aug 1971, J. Henrickson 6040. (holotype TEX; isotypes MEXU).

Additional specimens examined: MEXICO. Chihuahua: 9 km N of Cerros Blancos on winding road to Rancho La Gloria (27°08'N x 104°05'30'W), 1325 m, 31 Aug 1972, Johnston et al. 9039 (LL).

Coahuila: 12 km NNE of Las Margaritas on the eastern ridge of Sierra de las Margaritas ($26^{\circ}33'30''$ N x $102^{\circ}51'30''$ W), 1300-1400 m, 24 Sep 1972, Chiang et al. 9508C (LL); ca. 35 (air) mi SSW of Cuatro Ciénegas, N slope of limestone Sierra de Los Alamitos, ca. 9.2 (rd.) mi S of El Hundido ($26^{\circ}30'00''$ N x $102^{\circ}17'00''$ W), 29 Sep 1973 Henrickson 13680 (TEX); S part of Sierra de los Organos, ca. 9 1/2 km E of Puerto del Gallo (ca. $26^{\circ}43'30''$ N x $103^{\circ}01'00''$ W), 1200-2100 m, 8 Aug 1973, Johnston et al. 12125A (LL).

The specimens cited above are clearly related to Tradescantia wrightii, a species of trans-Pecos Texas, southeastern New Mexico and adjacent Mexico (cf. below) but differ in a number of traits, including edaphic preference, which I suspect is predominantly gypseous (Ca SO₄), for the plant has been collected in a region where gypseous outcrops abound. Indeed, the holotype was collected at a locality which I have visited and know to be predominantly gypseous and which houses a number of rare gypsophilic species including the genus Marshalljohnstonia (Henrickson, 1976) and yet other peculiar endemics (e.g. Nerisyrenia johnstonii Bacon). In addition, label data of two of the other specimens refer to gypsum outcrops or substrates (Chiang et al. 9408C and Johnston et al. 12125A) as part of the locale and roots of one of these show adhering gypsum soil particles.

During a visit to Austin sometimes in the mid 1970's D. Hunt of Kew, avid scholar of the Commelinaceae, noted by annotation on Chiang et al. 9508C that the plant presumably belonged to the Series Virginianae of the Section Tradescantia. However, I relate the species to T. wrightii which Hunt (1981) assigned "tentatively" to the Series Tuberosae which includes T. pinetorum Greene, a tuberous species of southern Arizona and adjacent Mexico which superficially resembles T. wrightii. Nevertheless, I would relate both T. wrightii and T. gypsophila to the series Virginianae; neither of the latter have tuberous roots and both produce short, but well defined rhizomes, strikingly different from the root system of T. pinetorum.

Tradescantia wrightii var glandulopubescens B. L. Turner - var nov.

A varietate typica pedicellis sepalisque conspicue glanduloso-pubescentibus et distributione magis meridionali differt.

TYPE. MEXICO. Coahuila: Sierra del Carmen, "sheltered hollow along rim of spectacular scarp that drops off to Boquillas country to the W, ca. 1 1/2 mi S of Pico de Cerda, ($29^{\circ}11'30''$ N x $102^{\circ}48'00''$ W), 2050 m, 11 Aug 1974, T. Wendt 556A (holotype LL).

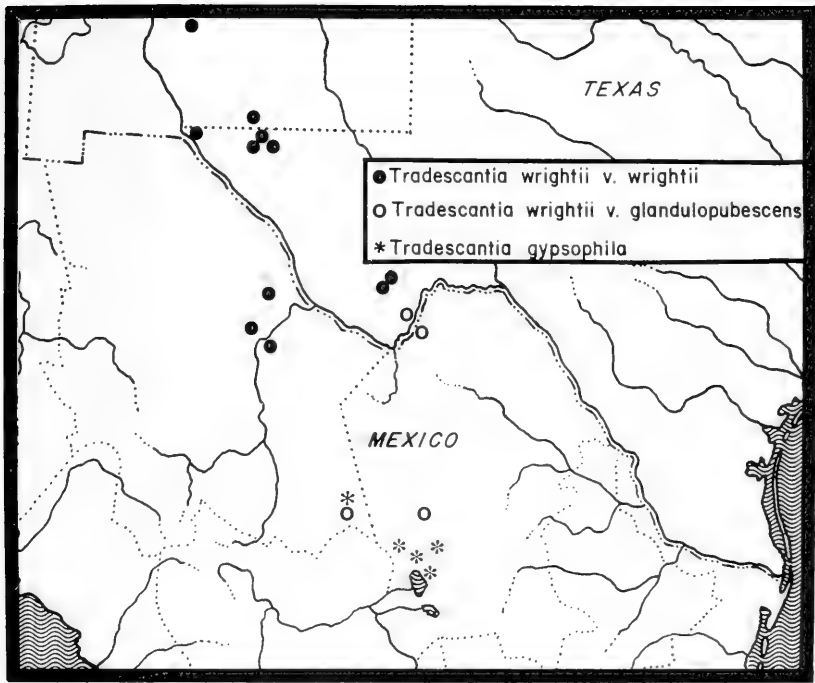


Fig. 1. Distribution of Tradescantia taxa.

Additional specimens examined: MEXICO. Chihuahua: 4 km. SSW of Cerro del Gringo in the Sierra del Diablo (ca. 27°09' x 104°08'), 30 Aug 1972, Chiang et al. 9022a (LL). Coahuila: 18.2 (rd.) mi W of Villa Ocampo towards Laguna del Rey, 4300 ft, 23 Sep 1974, J. Henrickson 14241 (TEX). Santa Rosa Mts (ca. 28°N x 102°W), 25 Jul 1938, E. M. Marsh 1479 (TEX).

U.S.A. Texas: Brewster Co.: Top of Dead Horse Mountains at head of Heath Canyon, 3800 ft, 19 Jul 1952, Warnock 10775 (LL).

The distributional relationships of the two allopatric varieties of Tradescantia wrightii are shown in Fig 1, along with that of T. gypsophila. It will be noted that the latter occurs in the vicinity of var. glandulopubescens but there is no indication of intergradations between the two, T. gypsophila being consistently broad-leaved and glabrous throughout. The var. glandulopubescens probably does intergrade with var. wrightii in regions of near sympatry, at least to judge from the variability of pubescence in the two varieties, but no clear intermediates were found in the present study.

Literature Cited

Henrickson, J. 1976. Marshalljohnstonia, a new genus (Asteraceae) with a rosette-shrub growth habit from Mexico. System. Bot. 1: 169-180.

Hunt, D. R. 1981. Sections and series in Tradescantia. Kew Bull. 35: 437-442.

ORTHOPHYTUM GURKENII, SP. NOV. (BROMELIACEAE)

Paul C. Hutchison
Research Associate, Herbarium
University of California, Berkeley, California

During an expedition organized by Roberto Burle Marx of Rio de Janeiro in September 1981, plants of a new species of *Orthophytum* with zebra-striped leaves were collected living. Subsequently these flowered in the Burle Marx and the Gurken collections in the suburbs of Rio de Janeiro and in November 1982, at the request of Luiz Carlos Gurken, I drew up the following description from examination of many living plants. In December this description was further elaborated at Berkeley from a living flowering specimen hand-carried by me from Brasil. It was then pressed as the holotype. An additional specimen prepared by Gurken in Brasil is being forwarded by me to Smithsonian as an isotype.

ORTHOPHYTUM GURKENII P. C. Hutchison, sp. nov. *Ab omnibus ceteris speciebus Orthophyti foliis purpureo-brunneis irregulariter zebrinis, spicis glabris globulosis pallide viridibus in inflorescentiis laxe bipinnatis usque ad 40 cm. altis, floribus sessilibus albis 15-16 cm. longis, sepalis viridibus 13 mm. longis discedit.*

Plants solitary with short, thick caudex, the sterile plants mostly up to 15 cm. tall and 25 cm. in diameter, larger in shade, somewhat smaller in the wild, especially when in full sun, the leaves suberect to spreading. Flowering plant 40 cm. tall with leaves to 25 cm. long and 4.5 cm. wide, shallowly and broadly canaliculate, spreading, arching recurved or the uppermost on the inflorescence deflexed, with a distinct sheath enfolding the stem, the blades broadly triangular-attenuate, laxly spinose with teeth up to 2.5 mm. long, deep purplish or purplish brown, irregularly and sparsely white lepidote beneath, above white lepidote in straight, wavy, or irregular to jagged lines mostly 2-3 mm. wide extending to the margins or nearly (zebra-striped), alternating with glabrous zones about 5 mm. wide. Scape arching, stout (1.5 mm. diameter basally, 6 mm. diameter below the first flowers), densely white lepidote with purplish epidermis visible. Scape bracts forming a series from the largest leaves to a lance-attenuate apical bract 10 cm. long, 24 mm. wide, deflexed but scarcely recurved, coriaceous, rounded basally, marked as the leaves with lepidote scales, the stalk lepidote. Inflorescence laxly bipinnate; axis white lanate-lepidote over purplish epidermis; primary bracts like the scape bracts but reduced to 9 x 2 cm., 5 x 2 cm., 4 x 2 cm. and down to ca. 1 x 1 cm., the uppermost ones becoming greenish and losing cross-striae, although still sparsely lepidote, all deflexed to parallel the axis or nearly; 3 to 6 spikes sessile,

semiglobose, many flowered, up to 3 cm. tall and 4 cm. in diameter, pale green; floral bracts lanceolate, acuminate, exceeding flowers, rigid, arched-recurving, whitish serrulate, pungent. Flowers 15-16 mm. long. Sepals symmetric, lance-triangular, attenuate, whitish below shading to pale green on the apical half, 13 mm. long, ecarinate to carinate, not coriaceous, margins and apex simple. Petals 15-16 mm. long, linear, obtuse apically, white, or white apically and somewhat greenish below. Filaments white. Ovary ovate, 4 mm. in diameter. Style barely exerted, whitish. Flowers scarcely pedicillate, mostly sessile.

BRASIL, state of Minas Gerais, Municipality of Teófilo Otoni, near the town, *Luiz Carlos Gurken and Sergio Gurken 1002* (UC 1475009-Holotype, US).

A supplementary number on the holotype is *P. C. Hutchison 8379*. The isotype was pressed in Brasil in 1982 by Luiz Carlos Gurken from his living collection in Vargem Grande near Rio de Janeiro. Plants are also cultivated by Roberto Burle Marx at his sitio, Santo Antonio de Bica, near Barra do Guaratiba just south of Rio de Janeiro. A single specimen is growing at Tropic World, Escondido, California.

This species is a narrow endemic. The population occupies an area no larger than 100 x 100 meters on rocky outcrops associated with *Lycopodium*, *Vellozia*, *Encholirion*, *Pseudopilosocereus*, a palm, and a nettle-like Euphorbiaceous shrub that stings painfully. The *Encholirion* likewise appeared to be endemic; the other species were seen elsewhere. Grazing occurs in the area and there is also danger of fire. Consequently this new species could easily be exterminated by indiscriminate collecting or by habitat destruction. Material for collectors should be produced from seed as the plant seldom offsets. The Gurken brothers are attempting to produce seedlings.

The zebra stripes on dark brown-purple leaves set this species apart from all other *Orthophytum* species. The aspect of the sterile plants is like *Cryptanthus zonatus* and *C. fosterianus*, but the color contrasts are stronger and the stripes more clearly defined, and the leaves are ultimately larger.

It is a pleasure to dedicate this new species to Luiz Carlos Gurken who, with his brother Sergio, has for the last dozen years or so collected many new species of Bromeliaceae and rediscovered many rare species throughout Brasil. They have a superb collection in Vargem Grande and are propagating the choicest of their discoveries from seed. Duplicates of many of their collections are growing in the private botanical garden of Roberto Burle Marx. Their collections include many rare and new species in other families from Brasil and other South American countries, most notably

in Cactaceae, Araceae, Velloziaceae, *Heliconia* and *Begonia*.

Color photographs of this striking new species will be published in the Bromeliad Journal.

A NOTE ON THE CLASSIFICATION OF FRUITS

K. N. Gandhi and R. Dale Thomas
The Herbarium, Department of Biology, Northeast Louisiana
University, Monroe, La. 71209.

Angiosperm fruits are broadly classified into three groups--simple, aggregate, and multiple. Simple fruits develop from one simple or compound ovary of one flower. Aggregate fruits develop from many ovaries of one flower. Multiple or composite fruits develop from many ovaries (1 per flower) of an inflorescence and develop as a single unit.

The fruits of a few taxa in Apocynaceae, Asclepiadaceae, Boraginaceae, Lamiaceae, Limnanthaceae, etc. do not correctly fit into any of these three categories. Individual flowers are involved in the formation of fruits in these taxa so their fruits are not multiple ones. These taxa have two free ovaries or four ovaries and all the ovaries of a flower are connected by a compound style or stigma. The presence of more than one ovary per flower rules out the choice of simple fruits. But their fruits are not the aggregate type because the carpels are not free (apocarpous gynoecia occur in Rosaceae, Magnoliaceae, and related families). The fruits of milkweed (Asclepias) are often called simple follicles but they are not simple fruits since they develop from more than one ovary. Delphinium in the Ranunculaceae is a correct example of a simple follicle.

The fruits of the taxa discussed here appear to be intermediate between simple and aggregate types. Simple fruits could be further divided into two groups. All fruits developing from a single simple or compound ovary are simple fruits (1-ovariate). The fruits developing from two or more ovaries of an apocarpous gynoecium are simple fruits (apo-ovariate). The simple fruit (apo-ovariate) may include pairs of follicles (eg., Asclepias, Calotropis, Catharanthus, Plumeria, etc.), four nutlets (eg., Cynoglossum, Heliotropium, Lamium, Leucas, Ocimum, etc.), and four achenes (eg., Limnantha). The simple fruits (apo-ovariate) should not be confused with schizocarpic fruits of the simple (1-ovariate) type. A schizocarpic fruit develops from one compound ovary and its carpels separate from each other only at maturity.

PLACENTATION IN BIGNONIACEAE AS ILLUSTRATED BY CATALPA,
MILLINGTONIA, KIGELIA, AND ECCREMOCARPUS

K. N. Gandhi and R. Dale Thomas
The Herbarium, Department of Biology, Northeast Louisiana
University, Monroe, La. 71209.

The Bignoniaceae has a bicarpellary superior ovary with many ovules. Placentation has been reported as parietal in a unilocular ovary and as two axiles in each locule of a bilocular ovary.

The ovaries in Catalpa, Millingtonia, and Kigelia are bilocular. The placentation in Catalpa is subaxile (figure 1) and that in Millingtonia and Kigelia is subparietal (figure 2). Catalpa has a swollen sterile tissue in the center of the ovary and on both sides of it bifid parietal placenta occur in the antero-posterior positions. The arrangement of the ovules in Millingtonia and Kigelia is almost the same but the central tissue is very thin. The central, thin sterile structure in these two genera is comparable to the structure of the replum found in the Crucifer ovary (Brassicaceae) (figure 4). The ovary of Eccremocarpus is unilocular with two bifid parietal placenta (figure 3).

From the evidence cited above, the parietal placentation (as in Eccremocarpus) in the Bignoniaceae could be derived from subaxile placentation (as in Catalpa) through subparietal placentation by the dissolution of the central tissue found in Millingtonia and Kigelia.

The authors thank Swami Vishnumayananda (S.R.K.V.M., Bangalore, India) for providing specimens of Kigelia and Millingtonia and also Dr. B. K. S. Singh, Mr. N. Mohan, and Miss P. Chandrika (National College, Bangalore) for a discussion on this topic.

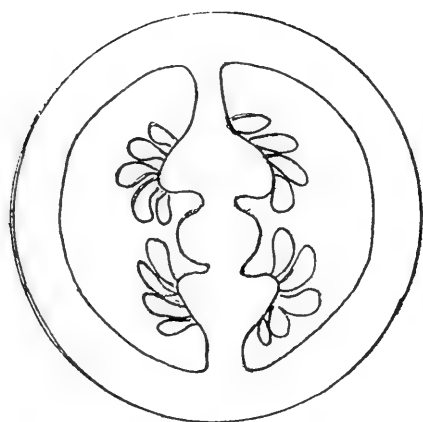


Figure 1

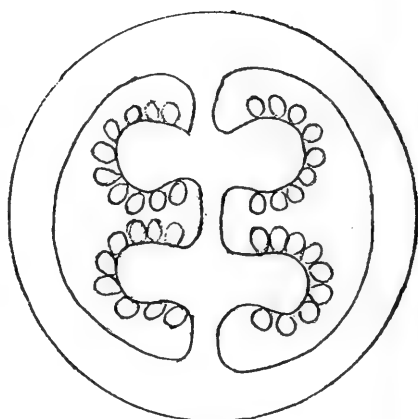
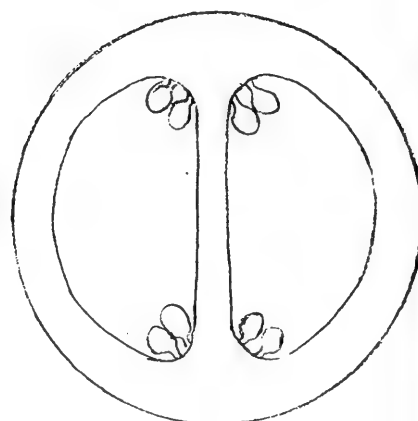
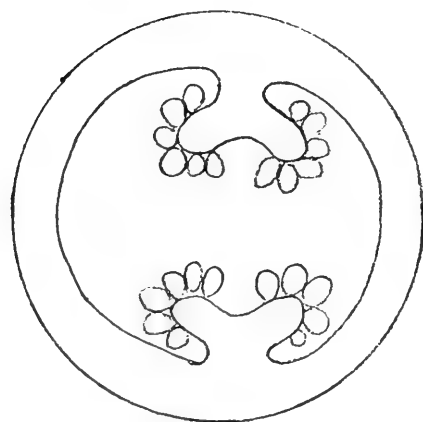


Figure 2

Figure 3

Figure 4



A REORGANIZED CONTRIBUTORS' INDEX TO THE
NATIONAL LIST OF SCIENTIFIC PLANT NAMES

Richard K. Rabeler

Beal-Darlington Herbarium & Lyman Briggs School
Michigan State University, East Lansing, MI 48824

As both a user and contributor to the *National List of Scientific Plant Names* (Rice et al., 1982), I have found it is often difficult to determine if the treatment of a particular taxon was contributed by an outside consultant. The index to contributors in volume 1 (pp. ii-iv) is arranged alphabetically by surname, with 221 specialists listed. In recent floras that have included numerous treatments by specialists, the reader can readily determine the contributor to the text or listings for a taxon, e.g. *Flora Europaea* (Tutin et al., 1964-1980). The checklist of Kartesz & Kartesz (1980) provided such information indirectly since the list of contributors is arranged alphabetically by pteridophyte, gymnosperm, and angiosperm families.

The index presented here represents a transformation of the contributor index in Rice et al. (1982) into a listing arranged by plant family. The numerical order of families followed by Rice et al. (1982) is used to allow for maximum compatibility. Genera are listed alphabetically within the assigned family. A few contributions are geographical (e.g. Wyoming plant distributions) rather than taxonomic and are listed at the end of the family listing.

LITERATURE CITED

- Kartesz, J.T., & R. Kartesz. 1980. A Synonymized Checklist of the Vascular Flora of the United States, Canada, and Greenland. University of North Carolina Press, Chapel Hill.
- Rice, W.E., et al. compilers. 1982. National list of scientific plant names. 2 vols. Soil Cons. Serv. Publ. SCS-TP-159.
- Tutin, T.G., et al., eds. 1964-1980. *Flora Europaea*. 5 vols. Cambridge University Press, Cambridge.
- Willis, J.C. 1966. A Dictionary of the Flowering Plants and Ferns. 7th ed. rev. by H.K. Airy Shaw. Cambridge University Press, Cambridge.

- 1-17 Pteridophyta
D.B. Lellinger
- 8 Polypodiaceae
Cryptogramma-T. Reeves
Macrothelypteris-A.R. Smith
Pseudophegopteris-ARS
Thelypteris-ARS
- 9 Ceratopteridaceae
Ceratopteris-R.M. Lloyd
- 18 Cycadaceae
Zamia-J.E. Eckenwalder
- 25 Typhaceae
Typha-D.E. Fairbrothers
- 26 Pandanaceae
B.C. Stone
- 27 Sparganiaceae
Sparganium-V.L. Harms
- 28 Potamogetonaceae
Potamogeton-R.R. Haynes
- 29 Najadaceae
Najas-R.R. Haynes
- 32 Alismataceae
Sagittaria-E.O. Beal,
J.W. Wooten
- 33 Butomaceae
Butomus-R.L. Stuckey
- 34 Hydrocharitaceae
Egeria-H. St. John
Elodea-HSJ
Vallisneria-R.M. Lowden
- 36 Gramineae
F.W. Gould
Amphicarpum
-D.E. Fairbrothers
Bouteloua-C.G. Reeder,
J.R. Reeder
Eragrostis-L.H. Harvey
Microstegium-DEF
Muhlenbergia-CGR
Stipa-M. Barkworth
Swallenia-T.R. Soderstrom
- 37 Cyperaceae
T. Koyama
Abildgaardia-R. Kral
Bulbostylis-RK
Carex-P.W. Ball, F.J. Hermann,
A.A. Reznicek, J.M. Webber
Fimbristylis-RK
Fuirena-RK
Hemicarpha-A.E. Schuyler
Psilocarya-RK
Rhynchospora-RK
Scirpus-AES
Websteria-RK, AES
- 38 Palmae
R.W. Read
- 40 Araceae
T.B. Croat, D.G. Huttleston,
D.H. Nicolson
- 46 Xyridaceae
R. Kral
- 47 Eriocaulaceae
R. Kral
- 49 Bromeliaceae
L.B. Smith
- 50 Commelinaceae
R. Faden
- 51 Pontederiaceae
S.C. Barrett
Pontederia-R.M. Lowden
- 53 Juncaceae
Juncus-F.J. Hermann
Luzula-J.C. Coffey
- 55 Liliaceae
Aletris-J.D. Ambrose
Allium-T.D. Jacobsen,
D.W. McNeal Jr.
Camassia-F.W. Gould
Chlorogalum-J.A. Jernstedt
Dasyllirion-H.S. Gentry
Erythronium-J.W. Hardin
Harperocallis-JDA
Hesperaloe-HSG
Melanthium-N.L. Bodkin

- Nartheceium*-J.D. Ambrose
Nolina-H.S. Gentry
Pleea-JDA
Smilax-G.A. Wallace
Tofieldia-JDA
Trillium J.D. Freeman
Yucca-HSG
- 56 Haemodoraceae
Lophiola-J.D. Ambrose
- 57 Amaryllidaceae
Agave-H.S. Gentry
Manfreda-S. Verhoek
Polianthes-HSG
Zephyranthes-HSG
- 61 Iridaceae
Alopha-P. Goldblatt
Iris-J.T. & R. Kartesz
Nemastylis-PG
Sisyrinchium
 -D.M. Henderson (W.US)
 R.L. Oliver (E.US)
Sphenostigma-PG
Trifurcia [*Herbertia* per
 Willis (1966)]-PG
- 67 Orchidaceae
C.A. Luer
Spiranthes-C.J. Sheviak
- 73 Salicaceae
Populus-J.E. Eckenwalder
Salix-G.R. Argus,
 R.D. Dorn
- 77 Juglandaceae
D.E. Stone
- 78 Betulaceae
Alnus-P.M. Mazzeo
Betula-PMM
- 79 Fagaceae
Quercus-J.M. Tucker
- 82 Urticaceae
I.J. Bassett,
C.W. Crompton,
D.W. Woodland
- 84 Loranthaceae
J. Kuijt
- 86 Santalaceae
S. Feuer
Buckleya-W.N. Carvell
Nestronia-WNC
Pyrularia-WNC
- 89 Olacaceae
S. Feuer
Ximenia-R.A. DeFilippis
- 91 Aristolochiaceae
H.W. Pfeifer
- 94 Polygonaceae
Chorizanthe-J.L. Reveal
Coccoloba-R.A. Howard
Eriogonum-JLR
Fagopyrum-R.S. Mitchell
Gilmania-JLR
Hollisteria-JLR
Nemacaulis-JLR
Oxytheca-JLR
Polygonella-J.H. Horton
Polygonum-RSM
Pterostegia-JLR
- 95 Chenopodiaceae
Atriplex-H.C. Stutz, K. Thorne
Chenopodium-H.D. Wilson
Grayia-HCS
Zuckia-HCS
- 97 Amaranthaceae
Acanthochiton-K.R. Robertson
Alternanthera-J.A. Mears
Amaranthus-KRR
Caraxeron [*Iresine* per
 Willis (1966)]-JAM
Celosia-KRR
Dicraurus-JAM
Gomphrena-JAM
Gossypianthus-JAM
Guilleminea-JAM
Iresine-JAM
Lithophila-JAM
Philoxerus-JAM
Tidestromia-JAM, KRR

- 98 Nyctaginaceae
R.W. Spellenberg
- 101 Phytolaccaceae
J.W. Nowicke
Phytolacca-J.W. Hardin
- 103 Portulacaceae
Claytonia-J. McNeill
Lewisia-J.E. Hohn
Montia-JM
- 105 Caryophyllaceae
R.L. Hartman, J. McNeill
Gypsophila-R.K. Rabeler
Paronychia-M.N. Chaudhri
Petrorhagia-RKR
Sagina-G.E. Crow
Silene-A.R. Kruckeberg
- 106 Nymphaeaceae
Nuphar-E.O. Beal
- 107 Ceratophyllaceae
Ceratophyllum-R.M. Lowden
- 109 Ranunculaceae
C.S. Keener
Clematis-W.M. Dennis
J.J. Wurdack
Ranunculus-L. Benson
- 113 Magnoliaceae
J.W. Hardin, F.G. Meyer
Magnolia-E. Murray
- 115 Calycanthaceae
Calycanthus-J.W. Hardin
- 117 Annonaceae
Asimina-R. Kral
- 123 Papaveraceae
Eschscholzia-C. Clark
Papaver-R.W. Kiger
- 124 Cruciferae
R.C. Rollins
Armoracia-R.L. Stuckey
Cardamine-RLS
Nasturtium-RLS
Rorippa-RLS
Thlaspi-P.K. Holmgren
- 126 Capparidaceae
H.H. Iltis
- 134 Crassulaceae
R. Moran
Sedum-R.T. Clausen,
M.F. Denton
- 136 Saxifragaceae
Astilbe-T.L. Mellichamp
Saxifraga-P.E. Elvander
- 142 Hamamelidaceae
Liquidambar-J.W. Hardin
- 144 Crossosomataceae
Apacheria-C.T. Mason Jr.
- 145 Rosaceae
K.R. Robertson
Alchemilla-J. McNeill
Amelanchier-W.A. Robinson
Aruncus- T.L. Mellichamp
Chrysobalanus-G.T. Prance
Hirtella-GTP
Licania-GTP
Petrophyton-W.J. Hess
Rubus-H.A. Davis, T.E. Davis,
A.M. Fuller
Spiraea-WJH
- 147 Leguminosae
D. Isely, S.L. Welch (Utah)
Aeschynomene-V.E. Rudd
Astragalus-R.C. Barneby
Bauhinia-R.P. Wunderlin
Cassia-H.S. Irwin
Crotalaria-D.R. Windler
Dalbergia-VER
Dalea-RCB
Desmodium-D.H. Nicolson
Errazuriz-RCB
Lespedeza-A.F. Clewell
Lupinus-D.B. Dunn
Marina-RCB
Neptunia-DRW
Nissolia-VER
Prosopis-B. Simpson
Psoralea-RCB
Sphaerophysa-RCB

- Trifolium*-J.M. Gillett
Zornia-V.E. Rudd
- 150 Oxalidaceae
Oxalis-M.F. Denton,
 A. Lourteig
- 152 Linaceae
 C.M. Rogers
- 154 Erythroxylaceae
Erythroxylum-T. Plowman
- 155 Zygophyllaceae
 D.M. Porter
- 157 Rutaceae
 B.C. Stone
- 159 Burseraceae
 D.M. Porter
- 160 Meliaceae
Melia-T.D. Pennington
- 161 Malpighiaceae
 W.R. Anderson
Galphimia-B. MacBryde
Malpighia-J.L. Vivaldi
- 165 Polygalaceae
 T. Wendt
 J.J. Wurdack (Caribbean)
- 167 Euphorbiaceae
 D. Burch
Chamaesyce-M.J. Huft
Croton-M.C. Johnston
Euphorbia-MJH
Galarhoeus-MJH
Manihot-D.J. Rogers
Margaritaria-G.L. Webster
Pedilanthus-MJH
Phyllanthus-GLW
- 172 Limnanthaceae
Limnanthes-R. Ornduff
- 174 Cyrillaceae
 J. Thomas
- 177 Aquifoliaceae
 T.R. Dudley
- 181 Staphyleaceae
 J.E. Eckenwalder
- 183 Aceraceae
Acer-E. Murray
- 184 Hippocastanaceae
Aesculus-J.W. Hardin,
 E. Murray
- 185 Sapindaceae
 T.B. Croat
- 189 Rhamnaceae
 M.C. Johnston
- 195 Malvaceae
 P.A. Fryxell
Eremalche-S.R. Hill
Malvastrum-SRH
Sphaeralcea-SRH
- 197 Bombacaceae
 A.G. Robyns
- 198 Sterculiaceae
Melochia-A. Goldberg
- 202 Ochnaceae
 C. Sastre
- 206 Theaceae
 S.A. Spongberg
- 211 Tamaricaceae
Tamarix-B.R. Baum
- 212 Fouquieriaceae
Fouquieria-J. Henrickson
- 213 Cistaceae
Hudsonia-L.E. Morse
- 218 Violaceae
Viola-A.J. Beattie
- 221 Turneraceae
 R. Ornduff
- 226 Loasaceae
 H.J. Thompson
- 228 Begoniaceae
 L.B. Smith

- 230 Cactaceae
L. Benson
- 236 Lythraceae
S.A. Graham
- 244 Melastomataceae
J.J. Wurdack
Rhexia-R. Kral
- 245 Onagraceae
P.H. Raven
Calylophus-H.F. Towner
Circaea-D.E. Boufford
Clarkia-H. Lewis
Epilobium-P.C. Hoch,
R.L. Stuckey
Gayophytum-H. Lewis
Oenothera-G.B. Straley,
H.F. Towner
- 251 Umbelliferae
L. Constance
- 252 Cornaceae
Cornus-R.H. Eyde
Garrya-RHE
Nyssa-RHE
- 256 Ericaceae
P.F. Stevens
Agarista-W.S. Judd
Gaylussacia-WSJ
Kalmia-J.W. Hardin
Leucothoe-WSJ
Lyonia-WSJ
Pieris-WSJ
Rhododendron-H.T. Skinner
Vaccinium
-S.P. Vander Kloet
- 261 Primulaceae
Lysimachia
-T.S. Cooperrider
- 263 Sapotaceae
H.A. Rodriguez-
Carrasquero
- 266 Symplocaceae
Symplocos-J.W. Hardin
- 267 Oleaceae
Forestiera-C.J. Brooks
- 269 Loganiaceae
Buddleja-E.M. Norman
Gelsemium-J.W. Hardin
- 270 Gentianaceae
Bartonia-J.M. Gillett
Eustoma-J.S. Pringle
Fauria-JMG
Gentiana-JSP
Gentianella-JMG
Gentianopsis-JMG
Halenia-JSP
Lomatogonium-JSP
Menyanthes-JMG
Nymphoides-JMG, R.L. Stuckey
Obolaria-JMG
Sabatia-JSP
Swertia-JSP
- 271 Apocynaceae
P. Boiteau(Caribbean),
J.W. Nowicke
Vallesia-E.M. Norman
- 273 Convolvulaceae
D.A. Powell
Calystegia-R.K. Brummitt
Convolvulus-D.F. Austin
- 274 Polemoniaceae
A. Day
- 275 Hydrophyllaceae
L. Constance
- 277 Verbenaceae
Verbena(Caribbean)
-H.N. Moldenke
- 278 Labiatae
J.T. & R. Kartesz, H. Lewis
Agastache-R.W. Saunders
Hedeoma-R.S. Irving
Hyptis-R.H. Harley
Lycopus-R.L. Stuckey
Phlomis-R.A. DeFilipps
Physostegia-P. Cantino,
W.F. Mahler

- Poliomnitha*-R.S. Irving
Rhododon-RSI
Stachydeoma-RSI
Stachys-J.E. Fairley,
 J.B. Nelson
- 280 Solanaceae
Brunfelsia-T. Plowman
Capsicum-W.H. Eshbaugh
Chamaesaracha-J.E. Averett
Leucophysalis-JEA
Margaranthus-JEA
Quincula-JEA
Solanum-K.E. Roe,
 E.E. Schilling Jr.
- 281 Scrophulariaceae
 J.T. & R. Kartesz
Agalinis-L.J. Musselman
Aureolaria-LJM
Castilleja-N.H. Holmgren
Chelone-T.S. Cooperrider
Chionophila-K. Lodewick,
 R. Lodewick, R.M. Straw
Cordylanthus
 -L.R. Heckard
Dasistoma-LJM
Gratiola-TSC
Keckiella-RMS
Macranthera-LJM
Mimulus-R. Bacigalupi,
 LRH, R.K. Vickery
Nothochelone-RMS
Orthocarpus-LRH
Paulownia-A.H. Gentry
Pedicularis-W.J. Hess
Penstemon-NHH, KL,
 RL, RMS
Tomanthera-LJM
- 282 Bignoniaceae
 A.H. Gentry
- 285 Orobanchaceae
 L.R. Heckard
- 286 Gesneriaceae
 L.E. Skog
- 288 Lentibulariaceae
 P. Taylor
- 290 Acanthaceae
 D.C. Wasshausen
- 294 Rubiaceae
 J.H. Kirkbride Jr.
Galium-L.T. Dempster(W.US),
 C.A. Lawson(E.US),
 C. Puff
Hedyotis-E.E. Terrell
Houstonia-EET
Kelloggia-LTD
Neolaugeria-D.H. Nicolson
Oldenlandia-EET
Pentodon-EET
Richardia-W.H. Lewis,
 R.L. Oliver
- 295 Caprifoliaceae
Diervilla-J.W. Hardin
Viburnum-T.R. Dudley
- 297 Valerianaceae
Centranthus-F.G. Meyer
Valeriana-FGM
Valerianella-D.M.E. Ware
- 300 Campanulaceae
 S.G. Shetler
Githopsis-J.E. Hohn
- 303 Calyceraceae
Acicarpa-H.E. Robinson
- 304 Compositae
 H.E. Robinson
Achillea-R.J. Tyrl
Amphiachyris-M.A. Lane
Arnica-T.M. Barkley
Baccharis-W.F. Mahler
Bartlettia-J.L. Strother
Cacaliopsis-JLS
Carduus-R.L. Stuckey
Chaptalia-B. Simpson
Chrysactinia-JLS
Chrysothamnus-L.C. Anderson
Cirsium-T.C. Fuller(Calif.)

- Coreopsis*-E.B. Smith
Crepis-R.A. DeFilipps
Dyssodia-J.L. Strother
Elephantopus-S.B. Jones
Emilia-T.M. Barkley
Erechtites-TMB
Erigeron-G.L. Nesom
Flaveria-A.M. Powell
Galinsoga-J.M. Canne
Gochmatia-B. Simpson
Greenella-M.A. Lane
Gutierrezia-MAL
Gynura-JLS
Haploesthes-JLS
Hecastocleis-BS
Helonium-M.W. Bierner
Helianthus-C.B. Heiser Jr.
Heterotheca-V.L. Harms
Hypochaeris-RAD
Jamesianthus-W.M. Dennis
Lepidospartum-JLS
Luina-JLS
Nicolletia-JLS
Parthenium-J.A. Mears
Perityle-AMP
Petasites-VLH
Peucephyllum-JLS
Porophyllum-JLS
Psathyrotes-JLS
Senecio-TMB
Silphium-T.R. Fisher
- Spilanthes*-R.K. Jansen
Stokesia-SBJ
Tagetes-JLS
Tetradymia-JLS
Thurovia-M.A. Lane
Trixis-S.B. Jones
Vernonia-SBJ
Viguiera-C.B. Heiser Jr.
Xanthocephalum-MAL
- Trees
 E.L. Little Jr.
- Wetlands flora
 P. Reed
- Colorado
 W.A. Weber
- Florida taxa
 D.B. Ward
- Hawaiian flora
 F.R. Fosberg
 H. St. John
- New Mexico flora
 B.F. Isaacs
- Texas flora
 M.C. Johnston
- Wyoming-Montana distributions
 R.D. Dorn

DOCE (12) HELICONIAS NUEVAS DEL ECUADOR

José E. Abalo, Apartado 266, Maracay 2101, Venezuela

&

Gustavo Morales L., Apartado Aéreo 1283, Popayán, Colombia

El presente trabajo está basado en observaciones y material colectado en dos recorridos efectuados en la República del Ecuador. El primer recorrido comprendió parte de los meses de Diciembre de 1979 y Enero de 1980; el segundo recorrido se efectuó en los meses de Junio y Julio de 1982, cubriéndose la misma area que en el primero, excepto por algunas zonas inaccesibles debido a derrumbes y/o trabajos de construcción de carreteras. Estas últimas zonas quedan pendientes para un estudio posterior.

Al igual que en nuestra publicación anterior (Abalo & Morales, 1982) todas las medidas e ilustraciones están basadas en material vivo. El mismo sistema de medidas basado en la altura del pseudotallo, largo del pecíolo y largo de la lámina se mantiene. Igualmente el sistema de descripción de hábitos se mantiene (Zingiberoide, Cannoid y Musoide); ahora bien, las especies descritas en el presente trabajo caen todas dentro del hábito Musoide.

También en esta publicación hemos mantenido el mismo patrón en las ilustraciones de las especies, a saber:

This study is based on observations and live specimens collected during two field trips in the Republic of Ecuador. The first trip took place during December 1979 and January 1980; the second trip took place during June and July 1982. The same areas were covered on both trips except for some locations that could not be reached due to landslides and/or road construction works. The specimens from these locations will be covered in a future publication.

As in our previous work (Abalo & Morales, 1982) all illustrations in this study are taken from live specimens. In addition all measurements, colors and shapes also are taken from live specimens. We are maintaining our system of measuring the pseudostem, petiole and blade and likewise are maintaining the same classification for the habits (Zingiberoid, Cannoid and Musoid). However, in this study all the species fall under the Musoid habit.

In the illustrations we are also following the same pattern as in our previous work, i.e.:

A) Inflorescence

B) Spathe cut open

A) Inflorescencia

C) Bract

B) Espata abierta

D) Flower

C) Bráctea

E) Staminode

D) Flor

F) Aristiform rudiment

E) Estaminodio

F) Rudimento aristiforme

Siguiendo nuestro criterio de que los holotipos permanezcan en su país de origen, hemos escogido el Herbario de la Universidad Católica en Quito, Ecuador para depositarlos. En caso de haber isotipos los hemos asignado al Herbario de la Facultad de Agronomía de la Universidad Central de Venezuela en Maracay, Venezuela y al Smithsonian Institution, Washington D. C., U. S. A.

Deseamos dejar constancia de la ayuda sin par prestada por el Dr. Gilbert Daniels a quien estamos profundamente agradecidos por habernos facilitado en préstamo todo el material por él compilado en lo que al género *Heliconia* se refiere. Gracias al gran número de fotografías de tipos tomadas por él durante sus visitas a herbarios de Europa, Norte y Sur América en momentos en que dichos tipos se encontraban allí depositados y no en préstamos eternos, nuestra labor se ha facilitado enormemente

Asimismo deseamos expresar nuestro agradecimiento al Dr. Víctor Badillo de la Universidad Central de Venezuela por sus oportunas sugerencias en nuestros primeros pasos, a la Sra. Mary

We believe that holotypes should remain in their country of origin. For this study we have chosen the Herbarium of the Universidad Católica in Quito (QCA) to deposit them. Any isotypes will be deposited in the Herbarium of the Facultad de Agronomía, Universidad Central de Venezuela, Maracay, Venezuela (MY) and the Smithsonian Institution, Washington D.C. (US).

We want to take this opportunity to thank Dr. Gilbert Daniels who allowed us the use of all his materials on *Heliconia*. The large number of photographs of types taken by him during his trips to Herbaria of Europe, North and South America at a time when the types were kept by the Herbaria and not on eternal loans has been of invaluable help and has facilitated our work enormously.

We also wish to express our gratitude to Dr. Victor Badillo, Universidad Central de Venezuela for his valuable suggestions at the project's inception; Mrs. Mary Lou Arttime, Miami, Florida for her help in our moment of desperation, and Mr. Joe Brenner, Quito, Ecuador for letting us use his nursery in Puyo, Ecuador to plant and reproduce the specimens collected by us.

Lou Artime de Miami, Florida
por su gran ayuda en momen-
tos de apuro y enfermedad y a
nuestro amigo Joe Brenner de
Quito, Ecuador por habernos
permitido usar su vivero en el
Oriente ecuatoriano para deposi-
tar material vivo y reprodu-
cirlo.

LITERATURA CITADA

ABALO, J. E. & MORALES L., G.
1982. Veinticinco (25) Nuevas
Heliconias de Colombia. *Phytolo-*
gia 51 (1) 1 - 61

BARREIROS, H. S. 1979. Arquite-
tura de *Heliconia* L. Neotenia
(*Heliconiaceae*). *Arquivos do*
Jardim Botânico XXIII 97 - 104

Heliconia angelica Abalo & Morales, sp. nov.

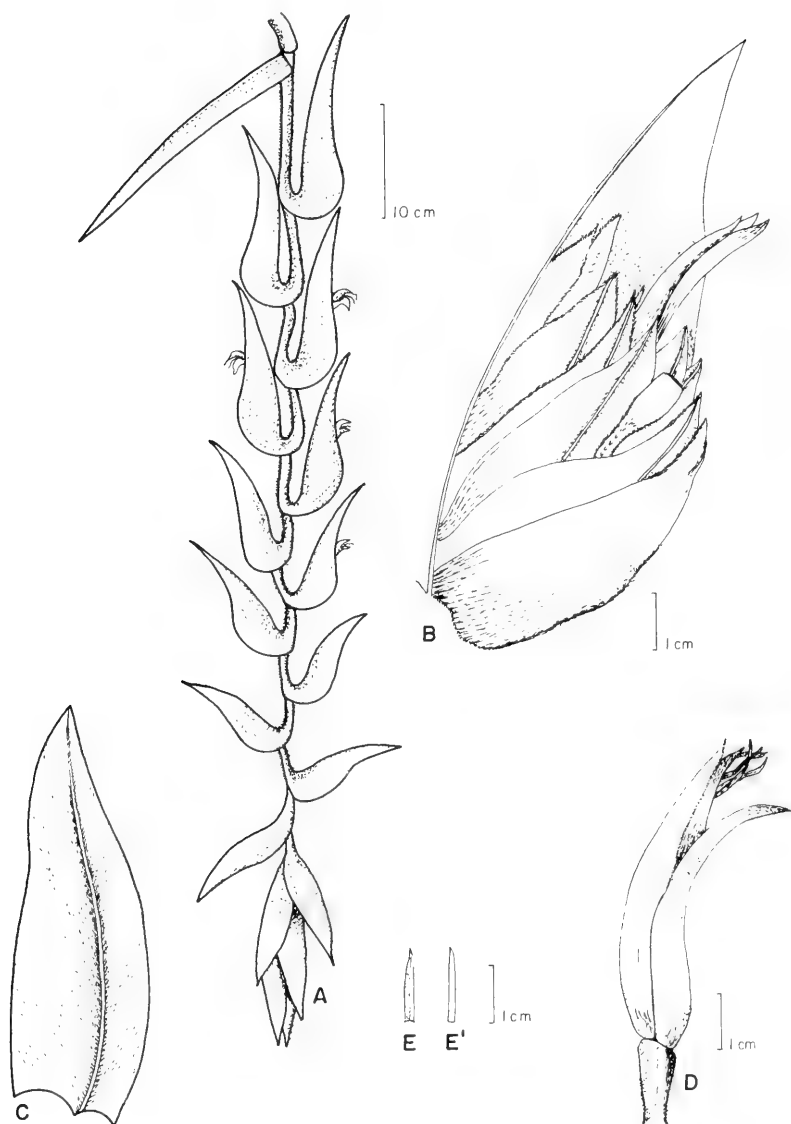
Planta musoides. Pseudocaulis viridis, 2.5 - 4.0 m altus. Petiolus 50 - 150 cm longus, glaber. Lamina 120 - 250 cm longa, 32 - 50 cm lata. Inflorescentia pendula. Spathae luteae. Perianthium luteum. Pedicellus luteus. Fructus immaturus luteus.

Planta musoide. Pseudotallo verde, 2.5 - 4.0 m. Hojas con pecíolo verde, glabro, 50 - 150 cm de largo; lámina 120 - 250 cm de largo por 32 - 50 cm de ancho, base cordada y ápice obtuso mucronado. Inflorescencia péndula 70 - 124 cm de largo; pedúnculo amarillo, pubescente, 30 - 46 cm de largo; raquis amarillo, muy pubescente, semiflexuoso. 40 - 78 cm de largo; distancia entre las espátas basales 7.0 - 4.5 cm, medias 3.0 - 2.5 cm y terminales 2.0 - 1.5 cm. Espatas amarillas, 18 - 22 por inflorescencia; primera espata generalmente no reflexa y estéril, 25 - 21 cm de largo por 3.5 - 3.0 cm de ancho; las demás espatas dísticas, reflexas, pubescentes, base auriculada, borde recto y ápice agudo; espatas basales 19 - 14 cm de largo por 5 - 4 cm de ancho en el tercio inferior, medias 14 - 11 cm de largo por 4.5 - 4.0 cm de ancho y terminales 10 - 8 cm de largo por 3.0 cm de ancho. Brácteas crema, coriáceas, carinadas, muy pubescentes externamente, 6.5 cm de largo por 3.0 cm de ancho. Flores 20 - 12 por espata, suavemente curvadas; perianto amarillo, 5.0 cm de largo, sépalos pubescentes en los bordes, pétalos glabros; estaminodio crema, subulado, 1.2 cm de largo por 0.2 cm de ancho; ovario crema glabro, 1.0 cm de largo; pedicelo amarillo, pubescente, 2.5 cm de largo. Frutos amarillos, 1.5 cm de largo, azules al madurar; pedicelos de los frutos 4.5 cm de largo.

Tipo: Gustavo Morales & José Abalo 304, 4 Julio 1982, Ecuador, Pichincha, Santo Domingo de los Colorados 57 Km vía Aloag (Tandapi) 1600 msm (QCA, holotipo; MY, US, isotipos)

El nombre de esta especie ha sido inspirado por la forma de sus espatas, que recuerda las alas de los ángeles.

Habitat: Zonas de precipitación media. Suelos húmico - arenosos. Sitios semi - abiertos o protegidos. Laderas.



Heliconia angelica

Heliconia brenneri Abalo & Morales, sp. nov.

Planta musoides. Pseudocaulis rubellus, pubescens superne, 1.0 - 1.5 m altus. Petiolus viridis, 44 - 92 cm longus. Lamina 62 - 120 cm longa, 25 - 34 cm lata, costa subtus rubra. Inflorescentia erecta. Rachis rubra, valde pubescens. Spathae rubrae, distichae. Perianthium viridiflavum, pubescens.

Planta musoide. Pseudotallo rojizo, pubescente en la parte superior, 1.0 - 1.5 m. Hojas con pecíolo verde, glabro, 44 - 92 cm de largo; lámina ovada - angosta, algunas veces cerosa por el envés, 62 - 120 cm de largo por 25 - 34 cm de ancho, base cordada, ápice obtuso con acumen; nervadura central roja por el envés. Inflorescencia erecta, 34 - 45 cm de largo; pedúnculo ausente o hasta 8 cm de largo, rojo, pubescente; raquis rojo, 31 - 43 cm de largo, muy pubescente; distancia entre las espatas basales 4.0 - 2.5 cm, en las demás 2.5 cm. Espatas rojo - escarlata, 9 - 13 por inflorescencia, dísticas, atenuado - cimbiformes con el ápice largamente acuminado, base auriculada, borde involuto en la base y recto hacia el ápice, muy pubescentes; primera espata basal verde con la base roja, hasta 33 cm de largo y 3.5 cm de ancho cerca a la base; espatas basales 20 - 15 cm de largo por 3.5 cm de ancho cerca a la base, medias 15 - 11 cm de largo por 3.0 - 2.7 cm de ancho y terminales 11 - 7 cm de largo por 2.2 - 1.8 cm de ancho. Brácteas crema con la base rosada, 7.0 cm de largo por 2.0 cm de ancho cerca a la base, carinadas, membranáceas, pubescentes externamente. Flores 20 - 12 por espata; perianto amarillo - verdoso, 5.5 cm de largo, curvado, sépalos pubescentes, el dorsal circinado, los otros dos con el ápice curvado hacia atrás, pétalos glabros; estaminodio blanco, ensiforme, 1.7 cm de largo por 0.2 cm de ancho en la base; ovario amarillo claro, glabro, 1.0 cm de largo por 0.7 cm de lado; pedicelo crema, pubescente, 2.5 - 2.0 cm de largo. Frutos amarillo - verdosos, azules al madurar, 2.0 cm de largo por 1.5 cm de lado.

Tipo: Gustavo Morales & José Abalo 308, 6 Julio 1982, Ecuador, Morona - Santiago, General Plaza Gutierrez (El Limón), 15 Km vía Gualaceo, 1930 msm (QCA, holotipo; MY, US, isotipos)

Dedicamos esta especie a nuestro amigo Joseph Brenner.

Habitat: Zonas de alta precipitación. Suelos húmico - arcillosos muy húmedos. Sitios semi - abiertos o protegidos. Laderas.



Heliconia brenneri

Heliconia burleana Abalo & Morales, sp. nov.

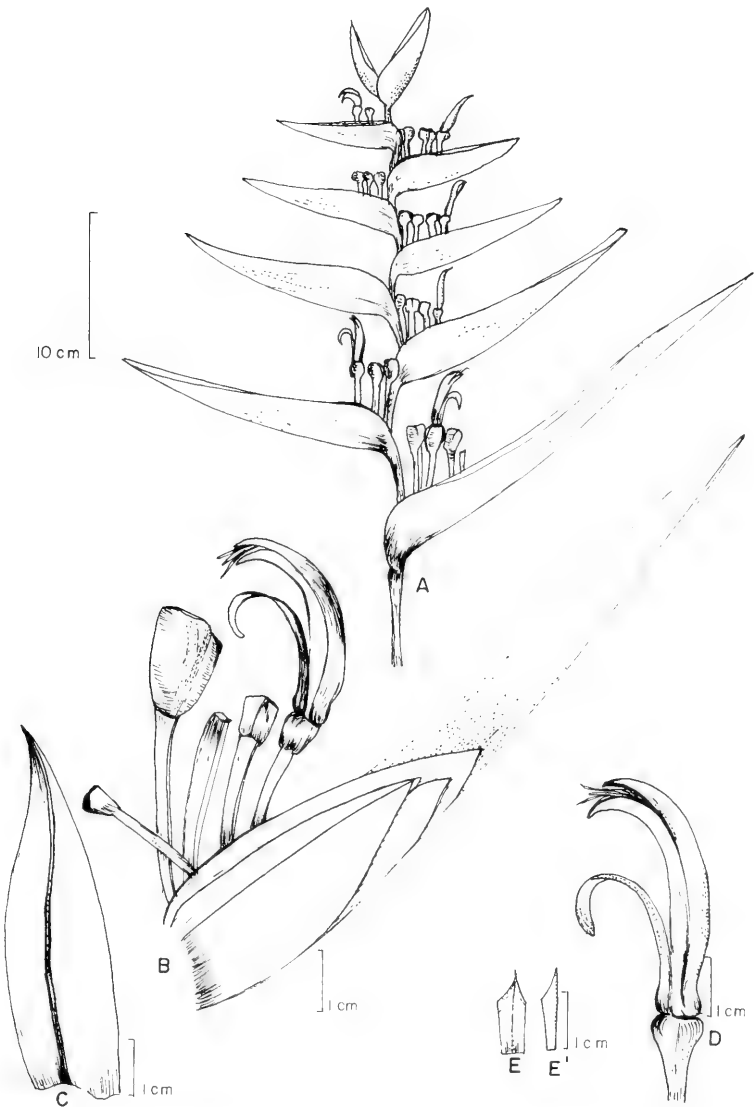
Planta musoides. Pseudocaulis 1.0 - 1.7 m altus.
Petiolus ruber, glaber, 63 - 70 cm longus. *Lamina* 80 - 110 cm longa, 23 - 28 cm lata, costa subtus rubra, tomentulosa. *Inflorescentia* erecta. *Rachis* rubra, glabra. *Spathae* rubrae, distichae. *Flores* exserti. *Perianthium* curvatum, viride, basis et apex albus. *Pedicellus* viridis, glaber. *Ovarium* luteum.

Planta musoide. Pseudotallo 1.0 - 1.7 m. Hojas 5 - 6, pecíolo rojo - vino tinto, glabro, 63 - 70 cm de largo. Lámina 80 - 110 cm de largo por 23 - 28 cm de ancho, base semicordada, ápice obtuso con acumen, borde rojo, nervadura central roja recubierta con un tomento aracnoide por el envés. Inflorescencia erecta, 40 - 53 cm de largo; pedúnculo rojo, glabro, 4 - 5 cm de largo; raquis rojo, glabro, 35 - 48 cm de largo; distancia entre las espatas basales 3.5 - 2.5 cm, medias 2 cm y terminales 1.5 cm. Espatas rojas, dísticas, lanceolado-conduplicadas, borde revoluto, ápice agudo, 10 - 14 por inflorescencia; la primera espata basal fértil, verdosa con el borde rojo, foliolada o no, 32 - 38 cm de largo por 3.0 cm de ancho; espatas basales 24 - 16 cm de largo por 2.5 cm de ancho en la base, medias 16 - 12 cm de largo por 2.5 - 2.0 cm de ancho y terminales 8.0 - 5.5 cm de largo por 2.0 - 1.0 cm de ancho. Brácteas blancas membranáceas, glabras, 7.0 cm de largo por 2.0 cm de ancho en la parte media. Flores 12 - 8 por espata, exsertas, curvadas; perianto verde con la base y el ápice blancos, 4.3 cm de largo, glabro; esta minodio blanco, lanceolado 1.7 cm de largo por 0.6 cm de ancho cerca al ápice; ovario amarillo, triangular, 1.0 cm de largo por 0.6 de lado, glabro; pedicelo verde, glabro, 2.5 - 2.0 cm de largo. Frutos amarillos, azules al madurar, 2.0 cm de largo por 1.5 cm de lado; pedicelos de los frutos verdes, 4.0 - 3.5 cm de largo.

Tipo: Gustavo Morales & José Abalo 294, 2 Julio 1982, Ecuador, Pichincha, Tandayapa, 39 Km Quito vía San Miguel de los Bancos, 2050 msm (QCA, holotipo)

Esta especie está dedicada al Dr. Roberto Burle Marx, gran heliconiófilo, descubridor de nuevas especies y promotor de su cultivo, como muestra de cariño y amistad.

Habitat: Zonas de precipitación media. Suelos arcillo - arenosos. Sitios abiertos. Laderas.



Heliconia burleana

Heliconia consueloi Abalo & Morales, sp. nov.

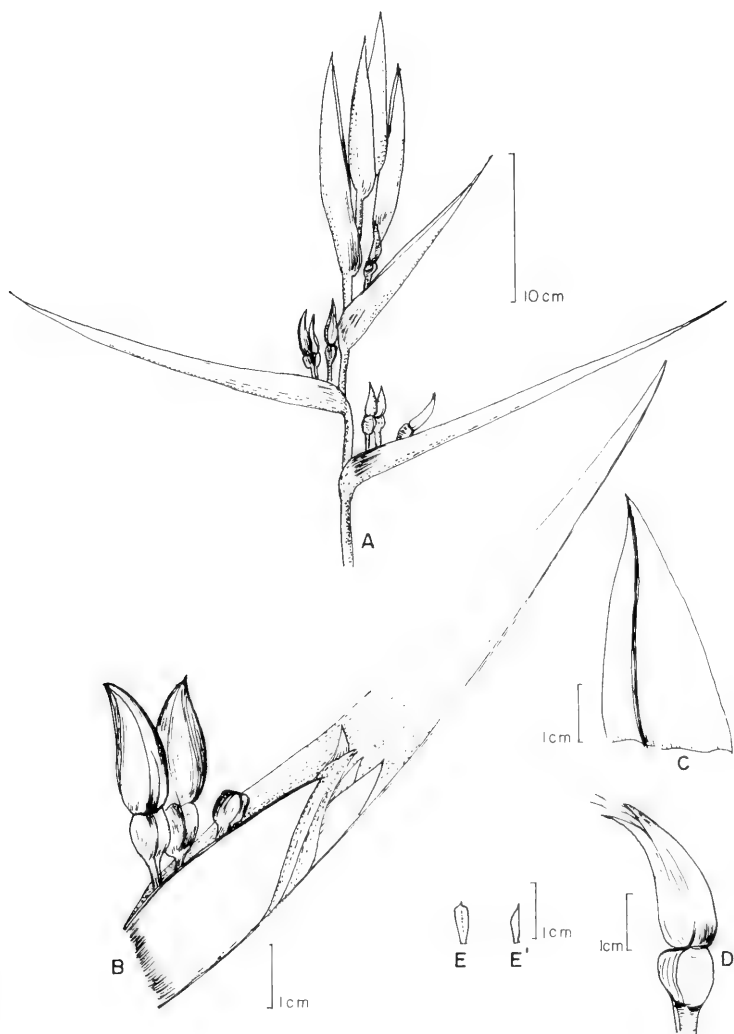
Planta musoides. Pseudocaulis 1.5 - 2.5 m altus. Petiolus 50 - 90 cm longus. Lamina 70 - 130 cm longa, 22 - 33 cm lata. Inflorescentia erecta. Spathae viridiflavae, basis aurantiaca - rosea. Flores exserti. Perianthium aureum. Ovarium citrinum.

Planta musoide. Pseudotallo verde con manchas negras, 1.5 - 2.5 m. Hojas 4 - 6, pecíolos verdes, algunos con manchas negras, glabros, 50 - 90 cm de largo; lámina 70 - 130 cm de largo por 22 - 33 cm de ancho, base breve atenuada, ápice obtuso con acumen; nervadura central rosada por el envés. Inflorescencia erecta, 30 - 54 cm de largo; pedúnculo verde claro finamente punteado de verde oscuro, glabro, 29 - 12 cm de largo; raquis amarillo - naranja, glabro, 26 - 16 cm de largo; distancia entre las espatas basales 4 - 3 cm, medias 2.5 - 2.2 cm y terminales 2.0 - 1.5 cm. Espatas externamente amarillo - verdoso con la base rojo - naranja, glabras, internamente amarillo claro, glabras, 6 - 10 por inflorescencia, dísticas, lanceolado - conducpladas, largamente acuminadas, borde recto; primera espata foliolada o nō, fértil, 30 - 22 cm de largo por 2.0 cm de ancho, espatas basales 26 - 14 cm de largo por 2.0 - 1.5 cm de ancho, medias 16 - 10 cm de largo por 2.0 - 1.5 cm de ancho y terminales 9 - 3.5 cm de largo por 1.5 - 0.5 cm de ancho. Brácteas amarillo claro, membranáceas, 4.0 - 3.5 cm de largo por 1.7 - 1.5 cm en la base, glabras. Flores exsertas, 14 - 10 por espata, piramidal curvadas; perianto amarillo oro, 3.0 cm de largo, sépalos glabros, pétalos glabros, crasos, con el borde rojo en antesis; estaminodio amarillo claro, obovado - angosto de ápice truncado y con acumen, 0.6 cm de largo por 0.2 cm de ancho; ovario verde amarillento, glabro, triangular, 1.0 cm de largo por 0.8 cm de lado; pedicelo verde amarillento, 2.5 - 1.5 cm de largo, glabro.

Tipo: Gustavo Morales & José Abalo 300, 2 Julio 1982, Ecuador, Pichincha, San Miguel de los Bancos, 15 Km vía Tandayapa - Quito, 1620 msm (QCA, holotipo; MY, isotipo)

Esta especie está dedicada a Consuelo F. de Abalo, esposa de uno de los autores.

Habitat: Zonas de alta precipitación. Bosque secundario con suelos húmicos. Sitios protegidos. Terrenos planos o de pendiente suave.



Heliconia consueloi

Heliconia flabellata Abalo & Morales, sp. nov.

Planta musoides. Pseudocaulis 1.3 - 2.5 m altus.
Petiolus viridis, 33 - 87 cm longus. *Lamina* 86 - 158
cm longa, 26 - 29 cm lata. *Inflorescentia erecta.*
Rachis rubra, pubescens. Spathae distichae, caducae,
rubrae, apices et margines auri. Perianthium album,
apex viridulus.

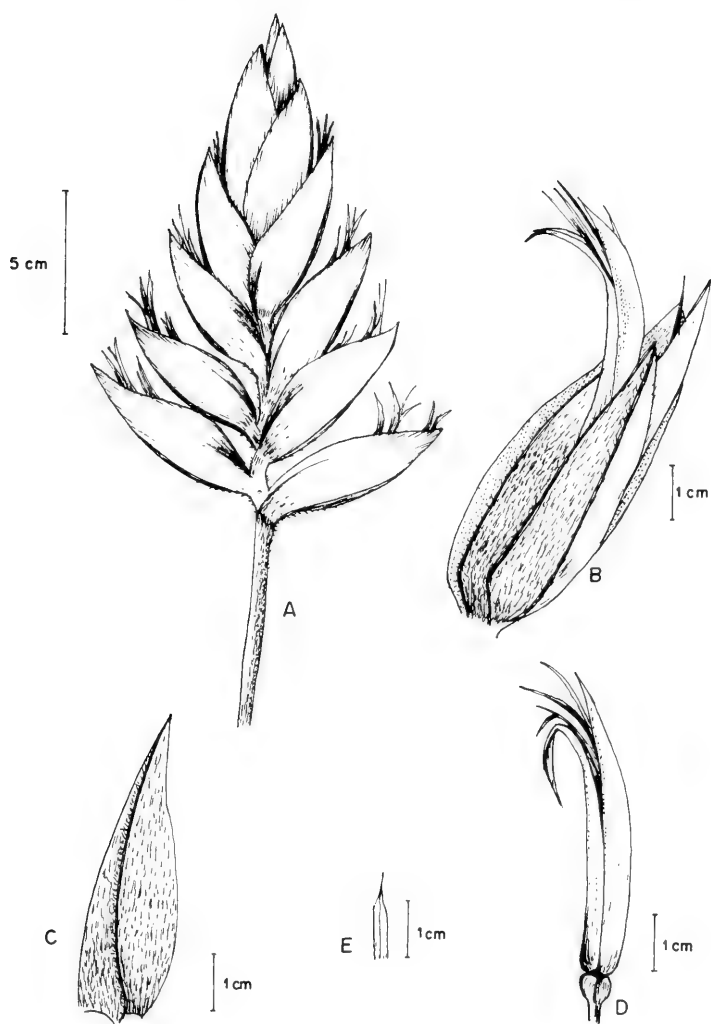
Planta musoide. Pseudotallo 1.3 - 2.5 m. Hojas con pecíolo verde, 33 - 87 cm de largo, glabro. Lámina 86 - 158 cm de largo por 26 - 29 cm de ancho, base semitruncada, ápice apiculado. Inflorescencia erecta, 60 - 80 cm de largo; pedúnculo verde, glabro, 21 - 40 cm de largo; distancia entre las espatas basales 1 - 2 cm. Espatas externamente rojas con el ápice y borde amarillo-verdoso, pubescentes; internamente crema, glabras; 27 - 40 por inflorescencia, cimbiformes, dísticas, caducas, borde involuto, 7.5 - 7.0 cm de largo por 2.5 cm de ancho cerca a la base. Brácteas exteriores con la base rosada y el ápice crema, las demás blancas, 5.0 - 5.5 cm de largo por 1.3 - 1.5 cm de ancho en la base y extendida, pubescentes exteriormente. Flores 7 - 9 por espata; perianto blanco en la base y verde claro hacia el ápice, 5.0 cm de largo, suavemente curvado, glabro; estaminodio blanco, linear con el ápice acuminado, 1.3 cm de largo por 0.2 cm de ancho; ovario blanco, glabro, 1.0 cm de largo; pedicelo blanco, pubescente, 1.0 cm de largo. Frutos azules al madurar.

Tipo: Gustavo Morales & José Abalo 313, 9 Julio 1982,
Ecuador, Napo, Lago Agrio, 20 Km vía Baeza,
360 msm (QCA, holotipo; MY, isotipo)

El nombre de esta especie hace referencia a su aspecto de abanico de palma tejida.

Habitat: Zonas de alta precipitación. Suelos muy arcillosos. Sitios semiabiertos. Terrenos planos.

Observaciones: Se diferencia de *H. episcopalis* por tener menor número de espatas por inflorescencia; en la antesis las espatas se separan unas de otras y aunque son caducas demoran mas tiempo unidas a la inflorescencia y posee mayor número de flores por espata (7 - 9)



Heliconia flabellata

Heliconia impudica Abalo & Morales, sp. nov.

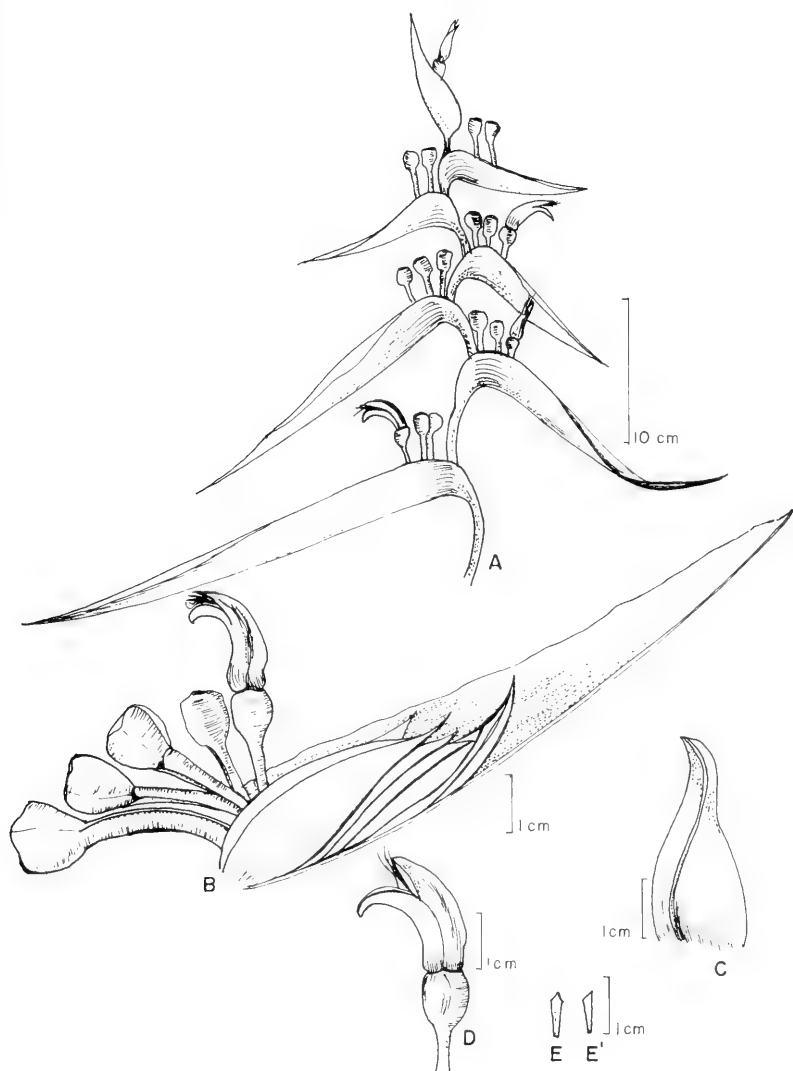
Planta musoides. Pseudocaulis pubescens superne, 1.0 - 1.6 m altus. Petiolus rubellus, glaber, 53 - 80 cm longus. Lamina 45 - 87 cm longa, 27 - 30 cm lata. Inflorescentia erecta. Rachis rubra, glabra. Spathae rubrae. Flores exserti. Perianthium luteum Fructus immaturus luteus. Fructus maturus atroviolaceus.

Planta musoide. Pseudotallo 1.0 - 1.6 m, pubescente en la parte superior. Hojas 5 - 6, pecíolo rojizo, glabro, 53 - 80 cm de largo; lámina con el haz verde oscuro y el envés verde o rojizo, 45 - 87 cm de largo por 27 - 30 cm de ancho, base semicordada o truncada, ápice obtuso con acumen; nervadura central roja por el envés. Inflorescencia erecta, 25 - 30 cm de largo; pedúnculo rojo, glabro, 3 - 5 cm de largo; raquis rojo, glabro, 22 - 25 cm de largo; distancia entre las espatas basales 4.0 cm, medias 2.5 cm y terminales 2.0 cm. Espatas 7 - 9 por inflorescencia, espiraladas, reflexas, lanceolado - conduplicadas con ápice agudo, borde recto; la primera espata foliolada o nó, verde con el borde rojo, 22 - 28 cm de largo por 2.5 cm de ancho, el resto rojas; espatas basales 15 - 12 cm de largo por 2.2 cm de ancho, medias 12 - 10 cm de largo por 2.0 cm de ancho y terminales 8 - 6 cm de largo por 1.5 cm de ancho. Brácteas blancas, membranaceas, glabras, 3.5 cm de largo por 1.5 cm de ancho en la base. Flores 11 - 8 por espata, cónicas, curvadas en la parte superior, exsertas; perianto amarillo, 2.5 cm de largo, sépalos glabros, pétalos con el borde rojizo, glabros; estaminodio blanco, linear de ápice mucronado, 0.5 cm de largo por 0.2 cm de ancho; ovario amarillo, 1.0 cm de largo, glabro; pedicelo amarillo claro, 1.5 cm de largo, glabro. Frutos amarillos 1.8 cm de largo por 1.5 cm de lado, violeta oscuro al madurar; pedicelo de los frutos amarillo - verdoso, 2.5 cm de largo.

Tipo: Gustavo Morales & José Abalo 295, 2 Julio 1982, Ecuador, Pichincha, Tandayapa, 42 Km Quito vía San Miguel de los Bancos, 1920 msm (QCA, holotipo; MY, isotipo)

El nombre de esta especie hace referencia a la posición obvia de las partes en la inflorescencia.

Habitat: Zonas de precipitación media. Suelos arcillo - arenosos. Sitios semi - abiertos. Laderas.



Heliconia **impudica**

Heliconia paludigena Abalo & Morales, sp. nov.

Planta musoides. Pseudocaulis 2 - 4 m altus. Petiolus 70 - 165 cm longus, glaber. Lamina 120 - 310 cm longa, 37 - 47 cm lata. Inflorescentia pendula. Rachis rubra, pubescens. Spathae cinnabarinae, margo luteus. Perianthium luteum. Rudimentum aristoides adest. Ovarium luteum.

Planta musoide. Pseudotallo 2 - 4 m. Hojas con pecíolo verde, glabro, 70 - 165 cm de largo; lámina 120 - 310 cm de largo por 37 - 47 cm de ancho, base cordada, ápice obtuso mucronado. Inflorescencia péndula, 70 - 115 cm de largo; pedúnculo rojo - marrón, pubescente, 33 - 55 cm de largo; raquis rojo marrón, semiflexuoso, muy pubescente, 44 - 60 cm de largo; distancia entre las espatas basales 6.5 - 3.5 cm, medias y terminales 2.5 - 2.0 cm. Espatas rojo - naranja con el borde amarillo, reflexas dísticas, pubescentes, auriculadas, borde involuto en la parte media y ondulado hacia el ápice, 18 - 22 por inflorescencia; primera espata estéril, no reflexa, 19 - 21 cm de largo por 3.0 cm de ancho; espatas basales 18 - 12 cm de largo por 3.5 cm de ancho, medias 11 - 9 cm de largo por 3.0 cm de ancho y terminales 8 - 6 cm de largo por 3.0 cm de ancho. Brácteas crema, coriáceas, carinadas, muy pubescentes exteriormente, 5.5 cm de largo por 2.8 - 2.3 cm de ancho en la base. Rudimento aristiforme amarillo claro, pubescente, unos 6.5 cm de largo. Flores 14 - 18 por espata; perianto amarillo, 5.0 cm de largo, sépalos pubescentes en los bordes, pétalos glabros; estaminodio crema, 1.0 cm de largo por 0.15 cm de ancho en la parte media, largamente lanceolado; ovario amarillo claro, 0.8 cm de largo, glabro; pedicelo amarillo, 2.8 - 2.3 cm de largo, muy pubescente. Frutos amarillos, 1.2 cm de largo, azules al madurar; pedicelos de los frutos 4.0 - 3.5 cm de largo.

Tipo: Gustavo Morales & José Abalo 306, 4 Julio 1982, Ecuador, Pichincha, M. Cornejo Astorga (Tandapi), 4 Km vía Santo Domingo de los Colorados, 1300 msm (QCA, holotipo; MY, isotipo)

El nombre hace referencia al sitio pantanoso donde crecía el ejemplar encontrado por nosotros.

Habitat: Zonas de precipitación media. Suelos arenos-arcillosos. Sitios semi-abiertos a abiertos. Terrenos planos, inundados o de pendiente suave.



Heliconia paludigena

Heliconia plagiotropia Abalo & Morales, sp. nov.

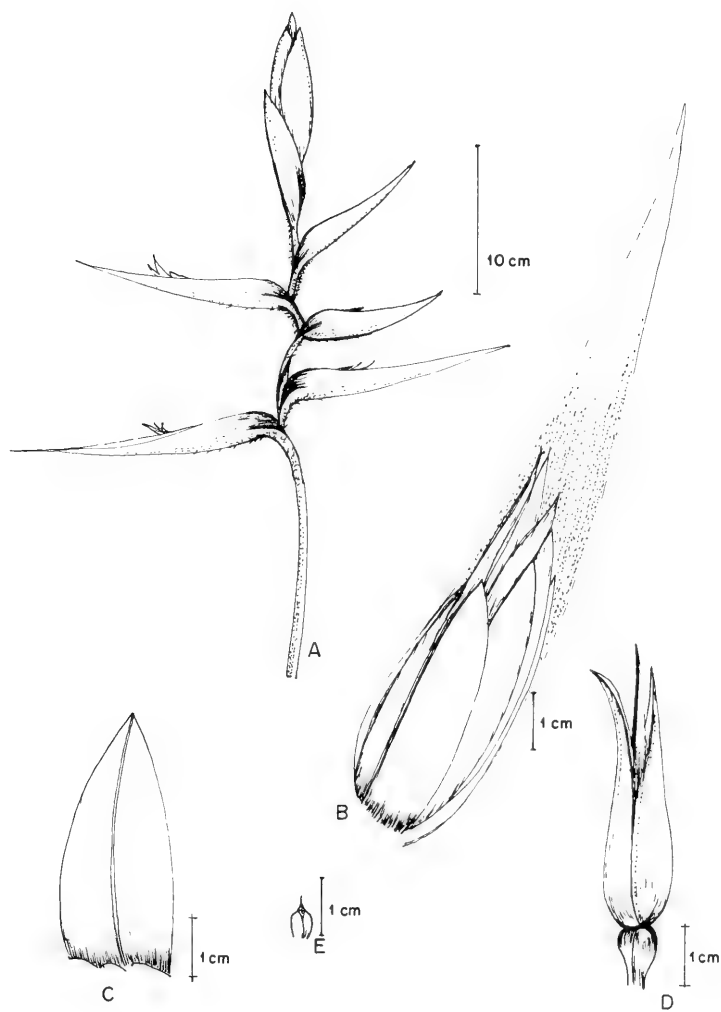
Planta musoides. Pseudocaulis brunneus aliquantulum ceraceus, 1.0 - 2.3 m altus. Rhizoma cylindricum, elongatum. Folia erecta. Petiolus viridis, 33 - 95 cm longus. Lamina 82 - 120 cm longa, 17 - 22 cm lata. Inflorescentia erecta. Rachis rubra, pubescens. Spathae rubrae, puberulae. Perianthium luteum. Ovarium luteo-viride. Fructus immaturus luteus.

Planta musoide. Pseudotallo 1.0 - 2.3 m, marrón, ligeramente ceroso. Rizomas cilíndricos, largos, plagiótrofos. Hojas erectas, pecíolo verde, 33 - 95 cm de largo, glabro; lámina 82 - 120 cm de largo por 17 - 22 cm de ancho, lanceolada. Inflorescencia erecta, 50 - 75 cm de largo; pedúnculo verde, finamente punteado de verde oscuro, 28 - 43 cm de largo; raquis rojo, pubescente, 20 - 32 cm de largo; distancia entre las espatas 2.5 - 2.0 cm. Espatas externamente rojas, finamente pubescentes, cuando jóvenes con una aurícula basal amarilla, internamente rojo - naranja y glabras; unas 12 espatas por inflorescencia, atenuado - cimbiforme, borde revoluto y ápice agudo, espiraladas; espatas basales 21 - 14 cm de largo por 3.0 - 2.5 cm de ancho, medias 12 - 10 cm de largo por 2.5 cm de ancho. Brácteas amarillo claro, membranáceas, suave - carinadas, glabras, 4.5 cm de largo por 2.5 cm de ancho en la base. Flores unas 14 por espata; perianto amarillo con el borde de los sépalos verde, glabro, 4.5 cm de largo, recto con un abultamiento en el tercio inferior; estaminodio amarillo claro, cuando extendido obovado de ápice truncado y mucronado, 0.6 cm de largo por 0.4 cm de ancho en la parte superior; ovario amarillo - verdoso, glabro, 1.0 cm de largo; pedicelo amarillo - limón, glabro, 1.0 cm de largo. Frutos amarillos, azules al madurar.

Tipo: Gustavo Morales & José Abalo 311, 7 Julio 1982, Ecuador, Los Rios, Quevedo, 14 Km vía Velasco Ibarra (El Empalme) 140 msm (QCA holotipo; MY, US, isotipos)

El nombre de esta especie hace referencia a su hábito de crecimiento en sentido horizontal mostrado por los rizomas siguiendo la clasificación en este aspecto de H.S. Barreiros (1979).

Habitat: Zonas de precipitación media. Suelos arcillosos. Sitios abiertos. Terrenos planos, inundados parte del año.



Heliconia plagiotropa

Heliconia sclerotricha Abalo & Morales, sp. nov.

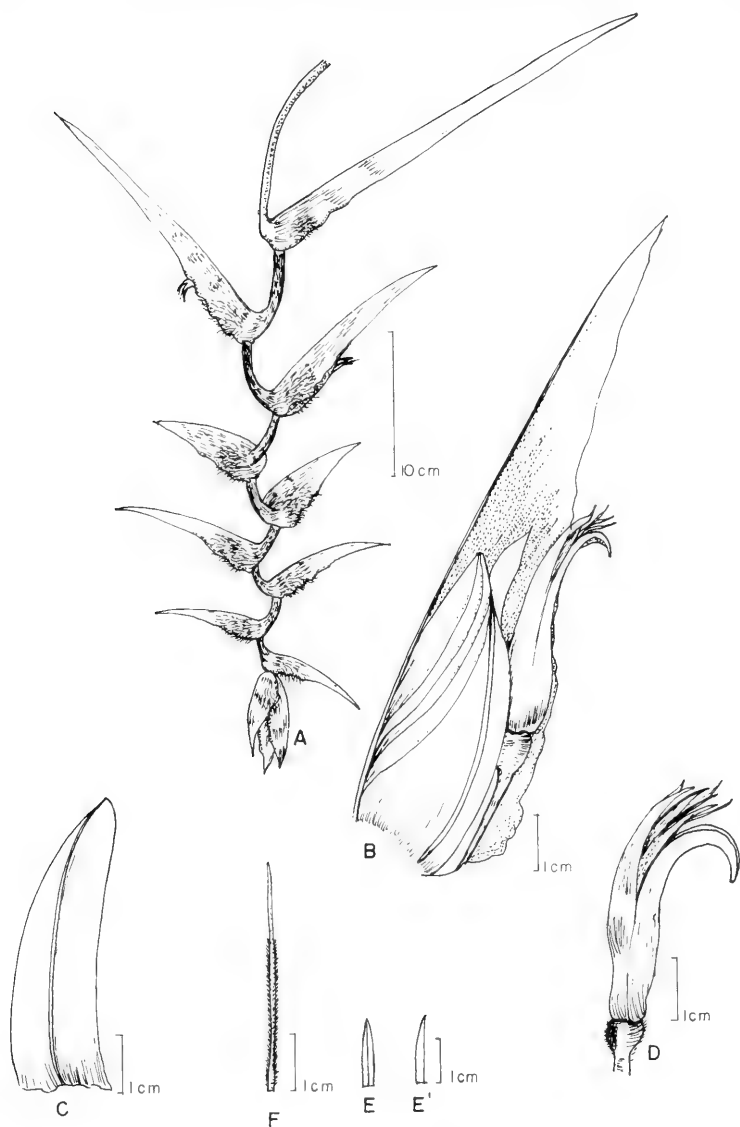
Planta musoides. Pseudocaulis lentiginosus, 1.0 - 1.5 m altus. Petiolus 0 - 62 cm longus. Lamina 110 - 160 cm longa, 18 - 22 cm lata, costa subtus rubra. Inflorescentia pendula. Spathae rubrae, pubescentes. Perianthium luteum. Rudimentum aristoides adest. Ovarium album, pubescens.

Planta musoide. Pseudotallo lentiginoso, 1.0 - 1.5 m. Hojas 4 - 6, sésiles o con pecíolos hasta 62 cm de largo, verdes con manchas marrón, glabros; lámina claviforme, 110 - 160 cm de largo por 18 - 22 cm de ancho; nervadura central marrón o rosada por el envés. Inflorescencia péndula, 60 - 75 cm de largo; pedúnculo rojo, glabro o ligeramente pubescente, 26 - 35 cm de largo; raquis rojo, flexuoso, ligeramente pubescente, 30 - 42 cm de largo; distancia entre las espatas basales 10 - 3 cm, medias 2.5 - 1.5 cm y apicales 1.0 cm. Espatas 12 - 18 por inflorescencia; primera espata roja en la base y verde con manchas marrón desde la parte media hasta el ápice, 40 - 33 cm de largo por 3.0 - 2.5 cm de ancho; las demás espatas rojas, reflexas de borde rosado y ápice agudo, con pelos duros dispuestos en la parte media y bordes, dísticas aunque al llegar a la madurez forman una suave helicoide; espatas basales 28 - 12 cm de largo por 3.5 - 3.0 cm de ancho, medias 12 - 8 cm de largo por 3 cm de ancho y terminales 6 - 5 cm de largo por 2.5 cm de ancho. Brácteas crema, carinadas, pubescentes externamente, 4.5 cm de largo por 1.8 cm de ancho. Rudimento aristiforme crema, pubescente 4.0 - 5.5 cm de largo. Flores 12 - 18 por espata; perianto amarillo, 4.5 cm de largo, sépalos pubérulos, pétalos glabros; estaminodio blanco, ensiforme, 1.5 cm de largo por 0.3 cm de ancho en la base; ovario blanco, pubescente, 0.6 cm de largo; pedicelo blanco, pubescente, 1.5 cm de largo. Frutos blancos, 1.3 cm de largo, azules al madurar.

Tipo: Gustavo Morales & José Abalo 298, 2 Julio 1982, Ecuador, Pichincha, San Miguel de los Bancos, 15 Km via Tandayapa - Quito, 1620 msm (QCA, holotipo)

El nombre de esta especie hace referencia a la dureza de los pelos presentes en sus espatas.

Habitat: Zonas de alta precipitación. Bosque secundario con suelos húmicos. Sitios protegidos. Terrenos planos o de pendiente suave.



Heliconia sclerotracha

Heliconia tandayapensis Abalo & Morales, sp. nov.

Planta musoides. Pseudocaulis ceraceus, 4 - 5 m altus. Petiolus 20 - 90 cm longus, glaber. Lamina 85 - 170 cm longa, 34 - 46 cm lata, subtus ceracea, costa subtus rubra. Inflorescentia pendula. Spathae atrococcineae, glabrae, ceraceae. Perianthium luteum. Ovarium eburneum. Fructus maturus violaceus.

Planta musoide. Pseudotallo 4 - 5 m, ceroso. Hojas 5 - 6, pecíolo verde con manchas rojas, 20 - 90 cm de largo, glabro; lámina 85 - 170 cm de largo por 34 - 46 cm de ancho, base cordada, ápice obtuso, cerosa por el envés; nervadura central roja por el envés. Inflorescencia péndula, 110 - 135 cm de largo; pedúnculo marrón, glabro, 23 - 35 cm de largo; raquis rojo, ligeramente pubescente, 82 - 100 cm de largo; distancia entre las espatas basales 4.5 - 3.5 cm, medias y apicales 2.5 cm. Espatas externamente rojo oscuras con el borde rojo claro, glabras, cerosas; internamente rojo claro, aterciopeladas; borde revoluto, ápice agudo, 19 - 28 por inflorescencia, espi-
raladas; espata basal estéril, no reflexa, 30 - 48 cm de largo por 3.5 cm de ancho en la base; espatas basales 29 - 15 cm de largo por 4.0 - 4.5 cm de ancho, medias 14 - 12 cm de largo por 4 cm de ancho y terminales 12 - 10 cm de largo por 4 cm de ancho. Brácteas crema, pubescentes exteriormente y principalmente sobre la carina, 7 - 8 cm de largo por 2.5 - 3.5 cm de ancho en la parte media. Flores 14 - 10 por espata; perianto amarillo, 5.6 cm de largo, sépalos muy pubescentes, pétalos glabros; estaminodio blanco, linear, ápice acuminado, 1.0 cm de largo por 0.15 cm de ancho; ovario crema, triangular, 1.5 cm de largo por 0.7 cm de lado, pubescente en los vértices; pedicelo amarillo, pubescente, 1.5 - 2.5 cm de largo. Frutos crema, 2.5 cm de largo por 1.5 cm de lado, morados al madurar.

Tipo: Gustavo Morales & José Abalo 296, 2 Julio 1982, Ecuador, Pichincha, Tandayapa, 45 Km Quito vía San Miguel de los Bancos, 1800 msm (QCA, holotipo; MY isotipo)

El nombre de esta especie hace referencia a la localidad de su tipo.

Habitat: Zonas de precipitación media. Suelos areno - arcillosos con capa de humus. Sitios semi - abiertos. Laderas.



Heliconia **tandayapensis**

Heliconia virginalis Abalo & Morales, sp. nov.

Planta musoides. Pseudocaulis pubescens, 1.5 - 2.8 m altus. *Petiolus tomentulosus*, 60 - 116 cm longus. *Lamina* 115 - 135 cm longa, 32 - 40 cm lata. *Inflorescentia erecta. Rachis rubra, pubescens. Spathae rubrae, pubescentes. Flores exserti. Perianthium album, apex subviridis. Petalia alba, glabra, margines rosei. Ovarium subviride. Fructus immaturus eburneus.*

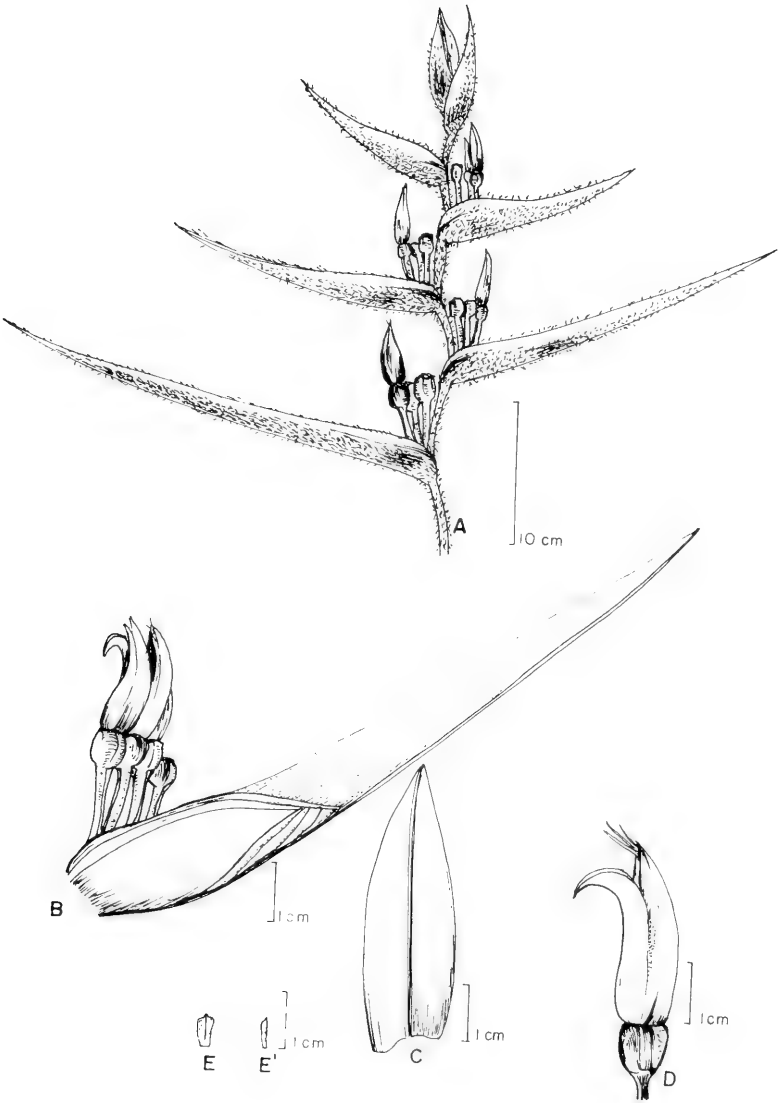
Planta musoide. Pseudotallo pubescente, 1.5 - 2.8 m.

Hojas con pecíolo verde, recubierto de un retículo aracnoide, 60 - 116 cm de largo; lámina 115 - 135 cm de largo por 32 - 40 cm de ancho, base semicordada y ápice obtuso con acumen. Inflorescencia erecta, 30 - 55 cm de largo; pedúnculo verde y glabro en la base, rojo y pubescente hacia las espatas; raquis rojo con pubescencia negra, 16 - 23 cm de largo; distancia entre las espatas basales 3.0 cm, medias 2.5 cm y terminales 1.5 cm. Espatas 6 a 10 por inflorescencia, dísticas; la primera verde con el borde rojo, fértil, foliolada o no, las demás rojo oscuro con pubescencia negra e hirsuta, lanceolado - conduplicadas, largamente acuminadas, de borde recto; espatas basales 38 - 21 cm de largo por 2.5 - 2.0 cm de ancho en la base, medias 15 - 12 cm de largo por 2.2 - 2.0 cm de ancho y terminales 8.5 cm de largo por 1.5 cm de ancho. Brácteas blancas, membranáceas, glabras, 5.0 cm de largo por 2.0 cm de ancho en la base. Flores exsertas, piramidales, curvadas en la parte superior, 12 - 8 por espata; perianto blanco en la base y verde claro hacia el ápice, 3.5 cm de largo, sépalos glabros, pétalos rosados en el borde, glabros; estaminodio blanco, laminar - cuneiforme, mucronado; ovario verde claro, glabro, 0.8 cm de largo; pedicelo blanco - marfil, 2.0 cm de largo, glabro. Frutos crema, globosos, 1.7 - 1.5 cm de largo por 2.0 - 1.6 cm de diámetro.

Tipo: Gustavo Morales & José Abalo 299, 2 Julio 1982, Ecuador, Pichincha, San Miguel de los Bancos, 15 Km vía Tandayapa - Quito, 1620 msm (QCA, holotipo; MY, isotipo)

El nombre de esta especie se ha basado en la coloración del perianto y su integración dentro del contexto de la inflorescencia.

Habitat: Zonas de alta precipitación. Bosque secundario con suelos húmicos. Sitios protegidos. Terrenos planos o de pendiente suave.



Heliconia virginalis

Heliconia willisiana Abalo & Morales, sp. nov.

Planta musoides. Pseudocaulis 1 m altus. *Petiolus viridis, glaber, 32 - 60 cm longus. Lamina aspectus velutinus, variegata, costa viridis pallida, 40 - 74 cm longa, 16 - 27 cm lata, costa subtus rubra. Inflorescentia erecta. Rachis rubra, pubescens. Spathae roseae. Flores exserti. Perianthium: basis eburnea, apex subviridis. Ovarium subviride.*

Planta musoide. Pseudotallo 1.0 m. Hojas 4 - 5, pecíolo verde, glabro, 32 - 60 cm de largo; lámina con el haz verde de oscuro de aspecto aterciopelado y con bandas horizontales verde claro - amarillento irregularmente dispuestas, 40 - 74 cm de largo por 16 - 27 cm de ancho, base suave - cuneada, ápice agudo a obtuso con acumen; nervadura central verde claro por el haz y rojo claro por el envés. Inflorescencia erecta, 10 - 44 cm de largo; pedúnculo ausente o hasta 26 cm de largo, verde, glabro; raquis rojo, pubescente 10 - 18 cm de largo; distancia entre las espatas basales 3 - 2 cm, medias 2 cm y apicales 1.5 cm. Espatas externa e internamente rojo claro, lanceolado - conduplicadas, ápice agudo, borde recto, ligeramente reflexas, espiraladas, externamente con pubescencia muy fina, 8 - 5 por inflorescencia; primera espata a veces foliolada y entonces verde con el borde rojo claro de 34 - 28 cm de largo y 1.7 cm de ancho o con foliolo muy pequeño en cuyo caso la espata es roja con una banda verde en el dorso; espatas basales 20 - 15 cm de largo por 1.7 - 1.5 cm de ancho, medias 15 - 10 cm de largo por 1.5 cm de ancho y terminales de 9 - 4 cm de largo por 1.5 - 0.5 cm de ancho. Brácteas blancas, tempranamente necrosadas, carinadas, glabras, 5.5 cm de largo por 1.3 cm de ancho en la base. Flores exsertas, 14 - 8 por espata; perianto con la base crema y desde la parte media hacia el ápice verde claro, glabro, 5 cm de largo; estaminodio blanco, linear, de ápice truncado con acumen, 0.6 cm de largo por 0.2 cm de ancho; ovario verde claro, glabro, 0.7 cm de largo; pedicelo verde claro a crema, glabro, 1.5 - 2.0 cm de largo.

Tipo: Gustavo Morales & José Abalo 297, 2 Julio 1982, Ecuador, Pichincha, San Miguel de los Bancos, 10 Km vía Santo Domingo de los Colorados, 960 msm (QCA, holotipo; MY, isotipo)

Esta especie está dedicada al Dr. W. H. Willis, Professor Emeritus & Head Emeritus, Agronomy Dept., Louisiana State University, profesor - guía de uno de los autores.

Habitat: Zonas de alta precipitación. Sitios planos sombreados. Suelos ricos en materia orgánica.



Heliconia willisiana

NOTES ON NEW AND NOTEWORTHY PLANTS. CLXIV

Harold N. Moldenke

LANTANA CANESCENS f. *PLURIPEDUNCULATA* Mold., f. nov.

Haec forma a forma typica speciei pedunculis saepe 4 per nodos recedit.

This form differs from the typical form of the species in often having more than two peduncles per node and in having the leaf-margins entire.

The form is based on J. P. P. Carauta 3761, collected on the banks of the Rio Pomba at Santo Antonio de Pádua, near Ibitiguaçu, Rio de Janeiro, Brazil, on April 28, 1981, and deposited in the Britton Herbarium at the New York Botanical Garden.

LIPPIA ROTUNDIFOLIA var. *CORDATA* Mold., var. nov.

Haec varietas a forma typica speciei laminis foliorum basaliter cordatis recedit.

This variety differs from the typical form of the species in having its leaf-blades basally cordate.

The variety is based on E. P. Héring 14827 from dry cerrado subject to periodic fires at the Estação Florestal "cabeca do veado", Distrito Federal, Brazil, collected on August 27, 1975, and deposited in the Britton Herbarium at the New York Botanical Garden. The collector asserts that the plant was 1.5 m. tall, erect, the inflorescence terminal, and the corollas rose-color.

PAEPAIANTHUS SPECIOSUS var. *GOYAZENSIS* Mold., var. nov.

Haec varietas a forma typica speciei pedunculis usque ad 18 cm. longis vaginis usque ad 2.5 cm. longis foliis supremis arcte divaricatis recedit.

This variety differs from the typical form of the species in having its uppermost stem leaves uniformly 3—5 cm. long and acutely divaricate, apically mucronulate, the sheaths only 2—5 cm. long at time of full anthesis, and the peduncles at time of full anthesis only 6—18 cm. long.

The variety is based on E. Yale Dawson 14271 from along a shaded dry creek in a hilly cerrado area 23 km. northeast of São João de Aliança, in the region of the Chapada dos Veadeiros at long. W. 47°30', lat. S. 14°30', Goiás, Brazil, collected on April 16, 1956, and deposited in the Lundell Herbarium at the University of Texas, Austin.

STACHYTARPHETA CHAMISSONIS var. *LONGIPETIOLATA* Mold., var. nov.

Haec varietas a forma typica speciei petiolis usque ad 2 cm. longis recedit.

This variety differs from the typical form of the species in having the petioles of its upper leaves to 2.5 cm. long, resembling those of var. andersonii Mold.

The variety is based on H. S. Irwin, R. M. Harley, and G. L. Smith 33117 from cerrado on outcrops with adjacent brejo (wet campo) about 50 km. north of Alto Paraíso, at about 1250 m. altitude, Chapada dos Veadeiros, Goiás, Brazil, collected on March 24, 1971, and deposited in the Britton Herbarium at the New York Botanical Garden. The collectors describe the plant as a subshrub about 75 cm. tall, the corollas orange to brown-orange.

STACHYTARPHETA SCHOTTIANA var. ANGUSTIFOLIA Mold., var. nov.

Haec varietas a forma typica speciei foliis valde angustioribus lineari-oblongis usque ad 5 mm. latis recedit.

This variety differs from the typical form of the species in having the leaves very much narrower, linear-oblong, and only to 5 mm. wide.

The variety is based on Araújo 4415 from an open restinga at Lagoa Comprida, in the municipality of Macaé, Rio de Janeiro, Brazil, collected on May 5, 1981, and deposited in the Britton Herbarium at the New York Botanical Garden.

- - - - -

NOTES ON THE GENUS CARYOPTERIS (VERBENACEAE)

Harold N. Moldenke

This is the 73th genus to be treated in the present series of notes in this and certain other journals since 1929. Because of a regrettable but unavoidable lack of time this late in life, the thorough and detailed monograph planned and previously announced is not now practical, but it still seems desirable to place on record the herbarium and bibliographic notes assembled by my wife, Alma L. Moldenke, and myself over the past 53 years. The herbarium acronyms herein employed are the same as have been used by me in all previous installments of these notes and have most recently been explained in full in *Phytologia* Memoirs 2: 463--469 (1980), with a supplement in *Phytologia* 50: 268 (1982).

We wish here again to express our thanks to Dr. Peter Hyypio, of the L. H. Bailey Hortorium, for his great help in resolving some difficult bibliographic problems, and to the library staff of the New York Botanical Garden for similar assistance.

CARYOPTERIS Bunge, Nov. Gen. Sp. Chin. Mongh. 1: 27 [Uchen. Zapisk. Kazan. Univ. 4: 178]. 1835.

Synonymy: Barbula Lour., Fl. Cochinch., ed. 1, 2: 366--367. 1790 [not Barbula Hedw., 1782]. Callipeltis Bunge ex Lindl., Nat. Syst. Bot., ed. 2, 278. 1836 [not Callipeltis Stev., 1829]. Mastacanthus Endl., Gen. Pl. 638. 1838. Carypteris Bunge ex Reichenb., Deutsch. Bot. [Repert. Herb. Nom.] 108. 1841. Cariop-

teris Bunge apud Franch., Nouv. Arch. Mus. Paris, ser. 2, 6: 111. 1883. Caryopteris Baill., Hist. Pl. 11: 92. 1891. Caryopteris P'ei, Mem. Sci. Soc. China 1 (3): 171, sphalm. 1932. Caryopteris P'ei, Mem. Sci. Soc. China 1 (3): 171, sphalm. 1932. Caryopteris P'ei, Mem. Sci. Soc. China 1 (3): 175, sphalm. 1932. Caryopteris P'ei, Mem. Sci. Soc. China 1 (3): 179, sphalm. 1932; Mold., Alph. List Inv. Names Suppl. 1: 4, in syn. 1947. Caryopteris P'ei, Mem. Sci. Soc. China 1 (3): 180 & 189, sphalm. 1932. Caryopteris Farrington, N. Y. Herald Trib. July 25, 2: 14. 1937. Caryopteris Trelease, Pl. Mat. Decorat. Gard. Woody Pl., ed. 5, imp. 1, 145, sphalm. 1940. Caryopteris Bunge apud Parsa, Fl. Iran 4 (1): 535, sphalm. 1949. Caryopteris Lawrence, Tax. Vasc. Pl., ed. 1, 785, sphalm. 1951. Caryopteris Tamm, Arch. Mikrobiol. 20: 281, sphalm. 1954. Callipeltis "Bunge ex Lindl." apud Angely, Cat. Estat. Gen. Bot. Fan. 17: 3. 1956. Caryopteris "Bunge ex Franch." apud Angely, Cat. Estat. Gen. Bot. Fan. 17: 3. 1956. Pseudocaryopteris Briq. ex Iljin, Acad. Sci. Bot. Inst. Dept. Repr. Mat. Hist. Fl. Veg. USSR. 3: 216. 1958. Caryopteris Grindal, Everyday Gard. India, ed. 16, 183. 1960. Caryopteris Miq. ex Mold., Résumé Suppl. 3: 30, in syn. 1962. Nepta Thunb. apud Li, Woody Fl. Taiwan 824 & 960, sphalm. 1963.

Bibliography: Houtt., Lin. Pfl. Syst. 2 (7): 429, pl. 56, fig. 2. 1777; Houtt., Natuur. Hist. 2 (9): 307, pl. 56, fig. 2. 1778; Thunb., Fl. Jap. 244. 1784; Lour., Fl. Cochinch., ed. 1, 2: 366—367 (1790) and ed. 2, 444. 1793; Willd. in L., Sp. Pl., ed. 4, 3: 52. 1800; Roxb., Hort. Beng., imp. 1, 46. 1814; Pers., Sp. Pl. 3: 328—339. 1819; D. Don, Prodr. Fl. Nepal. 102—103. 1825; Sweet, Hort. Brit., ed. 1, 1: 322. 1826; Wall., Numer. List [48] & 49 [=50], nos. 1759, 1812, & 1813. 1829; G. Don in Loud., Hort. Brit., ed. 1, 247. 1830; Sweet, Hort. Brit., ed. 2, 416. 1830; Wall., Numer. List 87, no. 1812. 1831; G. Don in Loud., Hort. Brit. ed. 2, 247. 1832; Benth., Lab. Gen. 706. 1834; Bunge, Uchen. Zapisk. Kazan. Univ. 4: 178—179. 1835; Bunge, Nov. Gen. Sp. Chin. Mongh. [Pl. Monghol.—Chin. Dec.; Opis. Novy. Rod. Vid. Kitaisk. Mong.] 1: 27—28. 1835; Bunge, Ann. Sci. Nat. Hist. Paris, ser. 2, Bot. 6: 64. 1836; Hook. & Arn., Bot. Beech. Voy. 205. 1836; Lindl., Nat. Syst. Bot., ed. 2, 278. 1836; Endl., Gen. Pl. 634 & 638. 1838; G. Don in Sweet, Hort. Brit., ed. 3, 550. 1839; Meisn., Pl. Vasc. Gen. 2: [Comm.] 193 & 290. 1840; Spach, Hist. Nat. Vég. 9: 227 & 228. 1840; Steud., Nom. Bot. Phan., ed. 2, 1: 302 & 383. 1840; Endl., Enchirid. Bot. 312. 1841; Reichenb., Deutsch. Bot. [Repert. Herb. Nom.] 108. 1841; Steud., Nom. Bot., ed. 2, 2: 105. 1841; W. Griff., Calc. Journ. Nat. Hist. 3: 367 [Remarks Few Pl. Cent. India 6]. 1842; Brongn., Enum. Gen. Pl., ed. 1, 119. 1843; D. Dietr., Syn. Pl. 3: 371, 372, 606, & 619. 1843; Jacques, Ann. Fl. Pom. [Journ. Jard.], ser. 2, 1: 318—319. 1843; Jacq., Ann. Fl. Pom. [Journ. Jard.], ser. 2, 3: 336—338, pl. 41. 1845; Voigt, Hort. Suburb. Calc. 466. 1845; Walp., Repert. Bot. Syst. 4: [3]. 1845; Lindl., Edwards Bot. Reg. 32 [ser. 2, 19]: pl. 2. 1846; Gerard, Hort. Univ. 7: 40. 1846; Sieb. &

Zucc., Abhandl. Akad. Wiss. Muench. Math.-Phys. 4 (3) [Fl. Jap. Fam. Nat. 2]: 154 & 156—157. 1846; Lindl., Veg. Kingd., ed. 1, 664, pl. 2 (1846) and ed. 2, 664, pl. 2. 1847; Schau. in A. DC., Prodr. 11: 525, 624—625, 657, 674, 675, & 696. 1847; Walp., Repert. Bot. Syst. 6: 686. 1847; Benth. in A. DC., Prodr. 12: 580. 1848; W. Griff., Itin. Notes [Posthum. Papers 2:]: 128. 1848; A. L. Juss. in D'Orbigny, Dict. Univ. Hist. Nat. 13: 185. 1849; Lemr. in D'Orbigny, Dict. Univ. Hist. Nat. 3: 201. 1849; Brongn., Enum. Gen. Pl., ed. 2, 119. 1850; Benth. in Hook. f., Journ. Bot. Kew Gard. Misc. 5: 135. 1853; Lindl., Veg. Kingd., ed. 3, 664. 1853; Jameson, Rep. Bot. Gov. Northw. Prov. 164. 1855; Schnitzl., Iconogr. Fam. Nat. 2: 137 Verbenac. [3]. 1856; Buek, Gen. Spec. Syn. Candoll. 3: 86, 106, 502, & 503. 1858; Benth., Fl. Hongk. 268. 1861; Miq., Journ. Bot. Néerl. 1: 144. 1861; Bocq. in Baill., Adansonia, ser. 1 [Rec. Obs. Bot.] 2: 86, 109—112, 118, 120, 128, 129, 143, 144, 143, & 153, pl. 19, fig. 1—9 (1862) and ser. 1, 3: 110, 178, 180, 182, 183, & 206—208. 1862; Bocq., Rév. Verbénac. 110—112, 120, 128, 129, 143, 144, 148, 153, 180, & 206—208, pl. 19, fig. 1—9. 1863; Miq., Ann. Mus. Bot. Lugd.-Bat. 2: 97. 1865; Miq., Prolus. Fl. Iap. 29—31. 1865; Maxim., Mém. Biol. Acad. Sci. St.-Petersb. 12: 522—524. 1866; J. F. Wats., Ind. Nat. Scient. Names 523. 1868; Miq., Cat. Mus. Bot. Lugd.-Bat. 70. 1870; Carr., Rév. Hort. 44: [450] & 451. 1872; Hance, Journ. Linn. Soc. Lond. Bot. 13: [Fl. Hongk. Suppl.] 116. 1873; Pfeiffer, Nom. Bot. 1 (1): 614 (1873), 2 (1): 13 & 132 (1874), and 2 (2): 1570 & 1593. 1874; Brandis, For. Fl. NW. Cent. India 324 & 370. 1874; Franch. & Savat., Enum. Pl. Jap. 1: 357—358 & 360. 1875; Inuma, Somoku Dzusetsu, ed. 1, 11: pl. 11 [12] & 38 [40]. 1875; Benth. in Benth. & Hook. f., Gen. Pl. 2 (2): 1136 & 1157—1158. 1876; Hemsl., Journ. Bot. 14 [ser. 2, 5]: 208. 1876; Kurz, For. Fl. Brit. Burma 2: 252 & 268. 1877; Maxim., Bull. Acad. Imp. Sci. St.-Petersb. 23 [Diagn. Pl. Nov. Asiat. Dec. 1]: 389—390. 1877; Maxim., Mém. Biol. Acad. Sci. St.-Petersb. 9: 829—830. 1877; S. Moore, Journ. Bot. 16 [ser. 2, 7]: 138. 1878; Maxim., Bull. Sci. Nat. Mosc. 54: 40—41. 1879; Gamble, Man. Indian Timb., ed. 1, 281, 299, & 503. 1881; Maxim., Bull. Acad. Imp. Sci. St.-Petersb. 27: 525—526. 1882; Maxim., Mém. Biol. Acad. Sci. St.-Petersb. 11: 256 & 301. 1882; Franch., Nouv. Arch. Mus. Hist. Nat. Paris, ser. 2, 6: 111. 1883; W. Robinson, Garden 24: 523. 1883; Anon., Gard. Chron., ser. 2, 21: 148 & 149, fig. 30. 1884; Franch., Pl. David., imp. 1, 1: 231. 1884; C. B. Clarke in Hook. f., Fl. Brit. India 4: 517, 561, & 596—598. 1885; Hook. f., Curtis Bot. Mag. 111 [ser. 3, 41]: pl. 6799. 1885; Olivier, Handelsbl. Tuinb. Sempervirens 14: [117] & 220. 1885; Maxim., Mém. Biol. Acad. Sci. St.-Petersb. 12: 491 & 523—524. 1886; Maxim., Bull. Acad. Imp. Sci. St.-Petersb. 31: 87—88. 1886; Durand, Ind. Gen. Phan. 322. 1888; Dippel, Handb. Laubholzk. 1: 59, fig. 24. 1889; Watt, Dict. Econ. Prod. India 2: 206. 1889; Collett & Hemsl., Journ. Linn. Soc. Lond. Bot. 28: 111. 1890; Forbes & Hemsl., Journ. Linn. Soc. Lond. Bot. 26 [Ind. Fl. Sin. 2]: 263—265. 1890; Verdier, Journ. Soc. Nat. Hort. Fr., ser. 3, 12: 574. 1890; Baill., Hist. Pl. 11: 87, 91, 92, & 115. 1891;

Hardy, Journ. Soc. Nat. Hort. Fr., ser. 3, 13: 598. 1891; André, Rév. Hort. 64: 324—325. 1892; Batalin, Act. Hort. Petrop. 13: 98. 1893; Bernard, Rév. Hort. Belg. 19: 273—274. 1893; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 272, 447, & 561 (1893) and imp. 1, 2: 175. 1894; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 137, 138, 140—142, 144, & 176—178, fig. 66 E—G. 1895; Gourlot, Le Jardin 9: 161. 1895; L. Henry, Le Jardin 9: 74. 1895; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 1214 & 1219. 1895; Legras, Rév. Hort. 67: 331—332. 1895; Ville, Bull. Soc. Tosc.ortic. 21 [ser. 3, 1]: 220—221, fig. 12 & 13. 1896; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): [381]. 1897; Engl., Syllab. Pflanzenfam., ed. 2, 178. 1898; Linden, Semaine Hort. 2: 89, fig. 229. 1898; L. H. Bailey, Cycl. Amer. Hort. 255. 1900; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 84—85. 1901; L. H. Bailey, Cycl. Amer. Hort. pl. 47. 1902; Collett, Fl. Siml., imp. 1, 378 & 381, fig. 121. 1902; Diels, Fl. Cent.-chin. 550. 1902; Gamble, Man. Indian Timb., ed. 2, imp. 1, 524 & 544. 1902; Engl., Syllab. Pflanzenfam., ed. 3, 188. 1903; Prain, Bengal Pl., imp. 1, 1: 66 (1903) and imp. 1, 2: 624, 824, & 836. 1903; Schelle in Beissner, Schelle, & Zabel, Laubholz-Benen. 426. 1903; C. K. Schneid., Dendrol. Winterst. 120, 201, & 267, fig. 122. 1903; Tillier, Rév. Hort. 75: 15—17, fig. 4. 1903; J. C. Willis, Dict. Flow. Pl., ed. 2, 292 & 604. 1903; Dalla Torre & Harms, Gen. Siphonog., imp. 1, 433. 1904; Post & Kuntze, Lexicon 688. 1904; Brandis, Indian Trees, imp. 1 & 2, 502 & 512—513 (1906) and imp. 2a, 502 & 512—513. 1907; Engl., Syllab. Pflanzenfam., ed. 5, 193. 1907; Spooner, Gard. Chron., ser. 3, 42: 408 & 409, fig. 171. 1907; D. H. Scott in Solered. [transl. Boodle & Fritsch], Syst. Anat. Dicot. 1: 634. 1908; J. C. Willis, Dict. Flow. Pl., ed. 3, 299 & 621. 1908; Engl., Syllab. Pflanzenfam., ed. 6, 198. 1909; Apgar, Orn. Shrubs U. S. 289, fig. 502. 1910; Gérôme, Jardin 24: 381, fig. 224. 1910; Kawakami, List Pl. Formos. 84. 1910; Brandis, Indian Trees, imp. 3, 502 & 512—513. 1911; Danguy, Bull. Mus. Nat. Hist. Nat. Paris 7: 344. 1911; Duthie, Fl. Upper Gang. Plain 2: 215, 228—229, & 263. 1911; Gerth van Wijk, Dict. Plantnames 259. 1911; Léveillé, Feddes Repert. Spec. Nov. 9: 223 & 449. 1911; Nakai, Fl. Korea 2: 137. 1911; C. K. Schneid., Illust. Handb. Laubholzk. 2: 587, 590, & 595—597, fig. 386 K—R. 1911; Fedde, Repert. Spec. Nov. 9: 325, 455, & 456 (1911) and 10: 64. 1912; Diels, Notes Roy. Bot. Gard. Edinb. 5: 296. 1912; Dunn & Tutchner, Kew Bull. Misc. Inf. Addit. Ser. 10: 201 & 205. 1912; Gilg in Engl., Syllab. Pflanzenfam., ed. 7, 314 & 363. 1912; Makino, Somoku Dzusetsu [Iconogr. Pl. Nipp.], ed. 2, 11: pl. 38. 1912; Matsum., Icon. Pl. Koisikav. 1: pl. 50. 1912; "A. C" in F. W. Harv., Garden 76: 24. 1912; Matsum., Ind. Pl. Jap. 2 (2): 530—531. 1912; Diels, Notes Roy. Bot. Gard. Edinb. 7: 332 & 347. 1913; Fedde & Schust., Justs Bot. Jahresber. 39 (2): 319. 1913; Wangerin, Justs Bot. Jahresber. 39 (1): 493. 1913; L. H. Bailey, Stand. Cycl. Hort. 1: 679. 1914; Bean, Trees Shrubs Hardy Brit. Isls., ed. 1, 1: 301. 1914; Fedde, Repert. Spec. Nov. Gesamtverz. 58. 1914; Fedde & Schust., Justs Bot. Jahresber. 40 (2): 334. 1915; Léveillé, Fl. Kouy-Tchéou 440. 1915; Bean, Trees Shrubs

Hardy Brit. Isls., ed. 2, imp. 1, 1: 301. 1916; Fedde, Justs Bot. Jahresber. 39 (2): 1331 & 1335. 1916; Léveillé, Sert. Yunnan 3. 1916; O. G. Peterson, Traeer Buske 437. 1916; Rehd. in Sarg., Pl. Wils. 3: 378. 1916; B. L. Robinson, Proc. Amer. Acad. Sci. 51: 531. 1916; Cowley, Garden 81: [478]. 1917; Léveillé, Cat. Pl. Yun-nan 277 & 298. 1917; Makino, Somoku Dzusetsu [Iconogr. Pl. Nipp.], ed. 3, 11: pl. 38. 1917; W. W. Sm., Notes Roy. Bot. Gard. Edinb. 10: 18. 1917; Dreer, Gard. Book 80: 184. 1918; R. N. Parker, For. Fl. Punjab, ed. 1, 395 & 403—404. 1918; W. Trelease, Wint. Bot. 332. 1918; Bean, Trees Shrubs Hardy Brit. Isls., ed. 2, imp. 2, 1: 301. 1919; Dreer, Gard. Book 81: 174. 1919; Gilg in Engl., Syllab. Pflanzenfam., ed. 8, 319 & 370. 1919; Thellung, Vierteljahrschr. Nat. Ges. Zürich 64: 782. 1919; Collett, Fl. Simla, imp. 2, 378 & 381, fig. 121. 1920; Dreer, Gard. Book 82: 169. 1920; Bean, Trees Shrubs Hardy Brit. Isls., ed. 3, 1: 301. 1921; Brandis, Indian Trees, ed. 4, 502 & 512—513. 1921; Nakai, Bot. Mag. Tokyo 35: 205. 1921; Prain, Ind. Kew. Suppl. 3, imp. 1, 49. 1921; Bean, Kew Bull. Misc. Inf. 1922: 110—111. 1922; Gamble, Man. Indian Timb., ed. 2, imp. 2, 524 & 544. 1922; Haines, Bot. Bihar Orissa, ed. 1, 4: 704 & 723. 1922; Wangerin, Justs Bot. Jahresber. 51 (1): 555. 1923; L. H. Bailey, Man. Cult. Pl., ed. 1, imp. 1, 634, 802, & 805. 1924; Bean, Garden 88: 183—184. 1924; Chung, Mem. Sci. Soc. China 1 (1): 228. 1924; Dreer, Gard. Book 86: 174. 1924; Gilg in Engl., Syllab. Pflanzenfam., ed. 9 & 10, 340 & 394. 1924; Makino, Illust. Fl. Jap. [216]. 1924; Olmsted, Coville, & Kelsey, Stand. Pl. Names, ed. 1, 70. 1924; R. N. Parker, For. Fl. Punjab, ed. 2, 395 & 403—404. 1924; L. H. Bailey, Man. Cult. Pl., ed. 1, imp. 2, 634, 802, & 805. 1925; Bean, Trees Shrubs Hardy Brit. Isls., ed. 3, 1: 301. 1925; Wangerin, Justs Bot. Jahresber. 46 (1): 368. 1925; J. C. Willis, Dict. Flow. Pl., ed. 5, 124 & 678. 1925; A. W. Hill, Ind. Kew. Suppl. 6: 38. 1926; Koidzumi, Bot. Mag. Tokyo 40: 333. 1926; Borsch, Hardy Herb. Alp. Pl. 8. 1927; Clute, Am. Botanist 33: [111]. 1927; Fedde & Schust., Justs Bot. Jahresber. 47 (2): 245. 1927; Itô, Icon. Pl. Formos. pl. 349. 1927; Rehd. in Rehd. & Wils., Journ. Arnold Arb. 8: 195. 1927; Kirk, Brit. Gard. Fls. 432. 1927; Osmaston, For. Fl. Kumaon 405 & 413—414. 1927; Hottes, Book Shrubs, ed. 1, 151—152. 1928; Kränzlin, Mitt. Deutsch. Dendrol. Gesel. 40: 353. 1928; Rehd. in Rehd. & Wils., Journ. Arnold Arb. 9: 112. 1928; Sasaki, List Fl. Formos. 350 & 425. 1928; Bean, Trees Shrubs Hardy Brit. Isls., ed. 4, 1: 301. 1929; Fedde, Justs Bot. Jahresber. 47 (2): 292. 1929; A. W. Hill, Ind. Kew. Suppl. 7: 41. 1929; E. H. Wils., China Moth. Gard. 23. 1929; L. H. & E. Z. Bailey, Hortus, ed. 1, 124. 1930; Kammerer, Bull. Pop. Inform. Morton Arbor. 5: 28 & 50. 1930; Hottes, Book Shrubs, ed. 2, 176—177. 1931; Stapf, Ind. Lond. 2: 82 & 233. 1930; Stapf, Curtis Bot. Mag. 154: pl. 9219. 1930; E. D. Merr., Sunyat. 1: 30. 1930; W. Trelease, Wint. Bot., ed. 3, imp. 1, 323 & 334. 1931; Bonstedt in Encke, Pareys Blumen-gärtn., ed. 1, 273, 282—283, & 662. 1932; Masamune, Trans. Nat. Hist. Soc. Formos. 22: 169. 1932; P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] 1, 7, 162—182, & 189, pl. 30—33. 1932;

- P'ei, *Sinensia* 2: 76--77. 1932; Schelle, *Pareys Blumengärtn.*, ed. 1, 282--283. 1932; Wilder, *Frag. Path.*, imp. 1, 113 & 385. 1932; Bean, *Trees Shrubs Hardy Brit. Isls.* 3, ed. 1, 75. 1933; Chittenden, *Gard. Chron.*, ser. 3, 94: 226 & 231, fig. 108. 1933; Fedde, *Justs Bot. Jahresber.* 51 (2): 269. 1933; Makino, *Gensyoku Yagai-shokubutu [Nature-Col. Wild Pl.]* 3: 201. 1933; Terasaki, *Nippon Shokubutsu Zufu [Jap. Bot. Illustr. Album]*, ed. 1, fig. 1455. 1933; Tu, *Chinese Bot. Dict.*, abridgd. ed., 662, 663, & 1389. 1933; Chittenden, *Gard. Chron.*, ser. 3, 94, 226, & 231, fig. 108. 1933; Chittenden, *Journ. Roy. Hort. Soc.* 59: 301 & *Proc.* cxxviii. 1934; Crevost & Pételot, *Bull. Econ. Indo-chine* 37: 1296. 1934; Dreer, *Gard. Book* [96]: 130. 1934; *Hand.-Mazz.*, *Act. Hort. Gotob.* 9: 68--69. 1934; Junell, *Symb. Bot. Upsal.* 1 (4): 112, 113, 115, 116, 118--120, 131, 204, & 284, fig. 182 & 183, pl. 7, fig. 4. 1934; Kingdon-Ward, *Pl. Hunt. Tibet* 17 & 171. 1934; Zander, *Gross. Gart.-Tex.* 131. 1934; L. H. Bailey, *Florists Handl. Verbenac.* [mss.]. 1935; L. H. & E. Z. Bailey, *Hortus*, imp. 2, 124. 1935; Bobbink & Atkins, *Roses Ornament. Trees Shrubs* 52 & 59. 1935; Dop in Lecomte, *Fl. Gén. Indo-chine* 4: 776, 874, & 885, fig. 90. 1935; Dreer, *Gard. Book* [97]: 21, 117, 131, & 135. 1935; Hu, *Bull. Chin. Bot. Soc.* 1 (2): 95. 1935; H. F. MacMill., *Trop. Plant. Gard.*, ed. 4, 104. 1935; E. D. Merr., *Trans. Am. Philos. Soc.*, ser. 3, 24 (2): 338 & 419. 1935; Rehd., *Journ. Arnold Arb.* 16: 311--313 & 472. 1935; Bean, *Trees Shrubs Hardy Brit. Isls.* 3, ed. 2, 75. 1936; Bedevian, *Illustr. Polyglott. Dict.* 150--151. 1936; Chittenden, *Journ. Roy. Hort. Soc.* 61: *Proc.* cxxxiii & clv. 1936; Diels in Engl., *Syllab. Pflanzenfam.*, ed. 11, 339. 1936; Dop in Lecomte, *Fl. Gén. Indo-chine* 4: 874 & 884--886. 1936; Dreer, *Gard. Book* [98]: 5, 21, & 121. 1936; Hillier, *Journ. Roy. Hort. Soc.* 61: 107--108. 1936; Makins, *Ident. Trees Shrubs*, ed. 1, 46, 62, 258, & 316, fig. 34 L & 50 F. 1936; Rehd., *Journ. Arnold Arb.* 16: 311. 1936; Wangerin, *Justs Bot. Jahresber.* 56 (1): 669. 1936; Wilder, *Frag. Path.*, imp. 2, 113 & 385. 1936; Farrington, *N. Y. Herald Trib.* July 25, 2: 14. 1937; Hara, *Bot. Mag. Tokyo* 51: 52. 1937; Rehd., *Journ. Arnold Arb.* 18: 243, 244, & 283. 1937; Wangerin, *Justs Bot. Jahresber.* 57 (1): 696. 1937; L. H. Bailey, *Man. Cult. Pl.*, ed. 1, imp. 3, 634, 802, & 805. 1938; Chittenden, *Ornam. Flow. Trees Shrubs* 145. 1938; Dahlgren, *Svensk Bot. Tidsk.* 32: 231. 1938; Fedde, *Justs Bot. Jahresber.* 57 (2): 742. 1938; Fletcher, *Kew Bull. Misc. Inf.* 1938: 405, 406, 409, & 437. 1938; Hao, *Engl. Bot. Jahrb.* 68: 633. 1938; H. W. Harv., *Ga. Univ. Exp. Sta. Serv. Bull.* 402, ed. 2, 34. 1938; Honda, *Siebold-Kenkyu* 579. 1938; E. D. Merr., *Journ. Arnold Arb.* 19: 362. 1938; Terazaki, *Nippon Shokubutsu Zufu [Nature-Col. Wild Pl.]* fig. 2489. 1938; Fedde, *Justs Bot. Jahresber.* 53 (2): 505. 1939; *Hand.-Mazz.*, *Act. Hort. Gotob.* 13: 336. 1939; Kanjilal, Das, Kanjilal, & De, *Fl. Assam* 3: 458, 459, 494--496, & 546. 1939; Mold., *Annot. List* 108. 1939; Sakata, *Reliable Seeds Nursery* 1939: 28. 1939; Totty's *Catalogue* 1939: 35. 1939; Bobbink & Atkins, [Catalogue] 1940: 67. 1940; Makino, *Illust. Fl. Nipp.* 185, fig. 553 & 554. 1940; Mold., *Prelim. Alph. List Inv. Names* 23 & 55. 1940; Mold., *Suppl. List*

Common Vern. Names 4. 1940; Rehd., Man. Cult. Trees, ed. 2, 806 & 933. 1940; Terasaki, Niipon Shokubutsu Zufu [Ja. Bot. Illust. Album], ed. 2, fig. 553. 1940; W. Trelease, Pl. Mat. Decorat. Gard. Woody Pl., ed. 5, imp. 1, 145. 1940; Anon., Gard. Chron., ser. 3, 110: 110 & 117, fig. 60. 1941; L. H. Bailey, Man. Cult. Pl., ed. 1, imp. 4, 634, 802, & 805. 1941; L. H. & E. Z. Bailey, Hortus Sec., imp. 1, 145. 1941; Biswas, Indian For. Rec., ser. 2 Bot., 3: 41. 1941; Bobbink & Atkins, [Catalogue] 1941: 43. 1941; Doney, Brooklyn Bot. Gard. Rec. 30: 23. 1941; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 2, 84—85. 1941; Fedde & Schust., Justs Bot. Jahresber. 60 (2): 571. 1941; A. D. Hall, Journ. Roy. Hort. Soc. 66: 455 & Proc. lxi. 1941; Heydenric, Gartenschönnh. 22: 92. 1941; Mold., Phytologia 2: 13. 1941; Mold., Suppl. List Inv. Names [1], 2, & 6. 1941; Sakata, Reliable Seeds Nursery 1941: 54. 1941; E. H. Walker, Contrib. U. S. Nat. Herb. 28: 655. 1941; Wangerin & Krause, Justs Bot. Jahresber. 60 (1): 662 & 753. 1941; Worsdell, Ind. Lond. Suppl. 1: 190. 1941; Hottes, Book Shrubs, ed. 4, 176—177. 1942; A. P. Johnson, Journ. Roy. Hort. Soc. 67: 366, fig. 120. 1942; Kelsey & Dayton, Stand. Pl. Names, ed. 2, 92—93. 1942; Mold., Alph. List Inv. Names 6, 12, 23, & 33. 1942; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 54—56, 58, 60, 71, & 87. 1942; Lemée, Dict. Descrip. Syn. Gen. Pl. Phan. 8b: 650 & 657. 1943; H. F. MacMill., Trop. Plant. Gard., ed. 5, imp. 1, 104 & 204. 1943; L. H. Bailey, Man. Cult. Pl., ed. 1, imp. 5, 634, 802, & 805. 1944; E. L. D. Seymour, New Gard. Encycl., ed. 3, 154, 230, & 1279. 1944; Trotter, Common Comm. Timb. India 229. 1944; Erdtman, Svensk Bot. Tidsk. 39: 281—284, fig. 5 & 6. 1945; Mold., Phytologia 2: 95. 1945; Higgins, Some Good Gard. Pl. 14. 1946; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 272 & 447 (1946) and imp. 2, 2: 175, 1214, & 1219. 1946; H. F. MacMill., Trop. Plant. Gard., ed. 5, imp. 2, 104. 1946; E. L. D. Seymour, New Gard. Encycl., ed. 4, 154, 230, & 1279. 1946; Mold., Alph. List Inv. Names Suppl. 1: 2, 4, 16, & 29. 1947; P'ei, Bot. Bull. Acad. Sin. 1: 6. 1947; Hara, Enum. Sperm. Jap., imp. 1, 1: 186—187. 1948; Makins, Ident Trees Shrubs, ed. 2, 46, 62, 289, & 355, fig. 34 L & 50 F. 1948; H. F. MacMill., Trop. Plant. Gard., ed. 5, imp. 3, 104 (1948) and ed. 5, imp. 4, 104. 1949; Aul, N. Y. Herald Trib., May 8, 5: 11. 1949; L. H. Bailey, Man. Cult. Pl., ed. 2, 845—846, 1042, & 1047. 1949; "R. G.", N. Y. Times, Aug. 28, X: 23. 1949; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 123, 128, 130, 131, 133, 134, 137, 157, & 178. 1949; H. N. & A. L. Mold., Pl. Life 2: 22—24, 26, 34, 58, & 59. 1948; Parsa, Fl. Iran 4 (1): [531] & 535—536, fig. 252. 1949; Rehd., Bibliog. Cult. Trees 585—586. 1949; Turrill, Curtis Bot. Mag. 166: pl. 75. 1949; Bean, Trees Shrubs Hardy Brit. Isl., ed. 7, 1: 365—367. 1950; P. Henderson, Everything Gard. 120. 1950; Hottes, Book Shrubs, ed. 5, 176—177. 1950; Metcalfe & Chalk, Anat. Dicot. 2: 1032—[1034], 1036, 1040, & 1041, fig. 247E, 1950; Sastri, Wealth India 2 (R): 90. 1950; A. Taylor, Sunday News [N. Y.], Sept. 3, 2: 12. 1950; A. W. Anderson, How We Got Fls., imp. 1, 213 & 271. 1951; Kelly Bros., 1951 Gard. Book 44. 1951; Lawrence, Taxon. Vasc. Pl., imp. 1, 688. 1951; E. L. D. Seymour, New Gard. Encycl., ed. 5, 154, 230, & 1279. 1951; J. C. Willis, Dict. Flow. Pl.,

- ed. 6, 124 & 678. 1951; Blackburn, Trees Shrubs East. N. Am. xi, 21, 108, 327, & 329. 1952; Erdtman, Pollen Morph. Pl. Tax., ed. 1, 448. 1952; Hottes, Book Shrubs, [ed. 6, imp. 1], 176--177. 1952; H. F. MacMill., Trop. Plant. Gard., ed. 5, imp. 5, 104. 1952; E. J. Salish., Ind. Kew. Suppl. 11: 45. 1953; Wayside Gard., Horticulture 31: 175. 1953; Anon., N. Y. Herald Trib., Feb. 21, 4: 15. 1954; Iwanami, Bot. Mag. Tokyo 67: 28--33. 1954; Lombardo, Invent. Pl. Cult. Montevide. 54 & 248. 1954; Mold., Journ. Calif. Hort. Soc. 15: 87. 1954; H. F. MacMill., Trop. Plant. Gard., ed. 5, imp. 6, 104. 1954; Tamm, Arch. Mikrobiol. 20: 281. 1954; Grubov, Konsp. Fl. M.N.R. 233. 1955; Plaumann, Gartenwelt 18: 285, fig. 1. 1955; Angely, Cat. Estat. Gen. Bot. Fan. 17: 3. 1956; Bean in Chittenden, Roy. Hort. Soc. Dict. 1: 405--406. 1956; Boerner in Maatsch, Pareys Illust. Gartenbaulex. 1: 205. 1956; Chittenden, Roy. Hort. Soc. Dict. Suppl. 177. 1956; Ikuse, Pollen Grains Jap. 128. 1956; H. F. MacMill., Trop. Plant. Gard., ed. 5, imp. 7, 104. 1956; R. N. Parker, For. Fl. Punjab, ed. 3, 576. 1956; Wyman, Shrubs Vines Am. Gard. 121--122 & 415. 1956; Anon., Commonw. Mycol. Inst. Index Fungi Petrak Cum. Index 2: 279. 1957; Chen' & Chahou, Rast. Pokrov. Sulenke 89. 1957; Anon., U. S. Dept. Agr. Bot. Subj. Index 15: 14354. 1958; Hottes, Book Shrubs, [ed. 6, imp. 2], 176--177. 1958; Iljin, Acad. Sci. Bot. Inst. Dept. Repr., Mat. Hist. Fl. Veg. USSR. 3: 152, 215, & 216, fig. 44. 1958; Mattoon, Pl. Buyers Guide, ed. 6, 88. 1958; Mold., Am. Midl. Nat. 59: 335. 1958; Anon., Kew Bull. Gen. Index 67. 1959; R. M. Carleton, Ind. Common Names Herb. Pl. 15, 16, & 85. 1959; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 3, 84--85. 1959; Hara, Outline Phytogeogr. Jap. 7 & 69. 1959; Hay, Gard. Chron. 145: 411. 1959; Hocking, Excerpt. Bot. A.1: 429. 1959; Hottes, Book Shrubs, [ed. 6, imp. 3], 176--177. 1959; Mold., Phytologia 7: 77--78. 1959; Mold., Résumé 160, 165, 168, 171--173, 177, 214, 237, 243, 245, 248--250, 262--264, 267, 272, 319--322, 354, 389, 392, 418, & 445. 1959; Mold., Résumé Suppl. 1: 11 & 14. 1959; Nut Tree Nursery, Spring '59 Price List. 1959; Bonsted in Encke, Pareys Blumengärtn., ed. 2, 2: 448--449. 1960; Grindal, Everyday Gard. India, ed. 16, 32, 34, & 183. 1960; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 272 & 447 (1960) and imp. 3, 2: 175, 1214, & 1219. 1960; Kelsey Nursery Serv., Short Guide Cat. 165: 35. 1960; Mold., Biol. Abstr. 35: 1688. 1960; Mold., Résumé Suppl. 2: 6. 1960; Nath, Bot. Surv. South. Shan States 305. 1960; Potztal in Encke, Pareys Blumen-gärtn., ed. 2, 2: 439. 1960; Prain, Ind. Kew. Suppl. 5, imp. 2, 49. 1960; Puri, Indian For. Ecol. 406. 1960; E. H. Walker, Bibliog. East. Asiat. Bot. Suppl. 1: 234. 1960; Wang, Pollen Grains China. 1960; J. D. Wils. & Hedden, Farm Home Res. Ohio Agr. Exp. Sta. 45: 8--9 & 41. 1960; Deb, Bull. Bot. Surv. India 3: 314. 1961; Haines, Bot. Bihar Orissa, ed. 2, 2: 738 & 758--759. 1961; Hershey, Price List Spring '61 Nut Tree Nurs. 4. 1961; Kelsey Nursery Serv., Short Guide Cat. 167: 25. 1961; Kau, Bull. Bot. Surv. India 3: 238. 1961; Runner, Rep. Groff Coll. 362. 1961; J. D. Wils., Hedden, & Walker, U. S. Dept. Agr. Bur. Pl. Ind. Pl. Disease Reporter 45: 330--383. 1961; R. M. Carleton, Ind. Common Names Herb. Pl., imp. 2, 16 & 85. 1962; Hocking, Excerpt. Bot.

A.4: 592. 1962; Kelway, Seaside Gard., imp. 1, 49, 138, 169, & 201. 1962; H. F. MacMill., Trop. Plant. Gard., ed. 5, imp. 8, 104. 1962; Mold., Résumé Suppl. 3: 19, 27, & 30. 1962; Nair & Rehman, Bull. Nat. Bot. Gard. Lucknow 76: 2, 19, & 21, fig. 25. 1962; Pearce Seeds Plants, Our Am. Wild Fls. 15. 1962; Whitlock & Rankin, New Techn. Dried Fls. 21 & 27. 1962; J. D. Wils. & Hedden, U. S. Dept. Agr. Bur. Pl. Ind. Pl. Disease Reporter 46 (3): 186—188, fig. 1—3. 1962; J. D. Wils. & Hedden, Hort. Abstr. 32: 666. 1962; E. B. Anderson in Anderson, Balf., Fish, Wallis, & Finnis, Oxford Book Gard. Fls., imp. 1, 171 & 203, pl. 171, fig. 5. 1963; Bush-Brown, Shrubs Trees Home Landsc. 77—79, [205], & 206, fig. 23. 1963; W. J. Cody, Ind. Sem. Canada Dept. Agr. 1963: 12. 1963; Dalla Torre & Harms, Gen. Siphonog., imp. 2, 433. 1963; Graf, Exotica 3: 1483 & 1568. 1963; Li, Woody Fl. Taiwan 17, 824, 825, 944, & 960, fig. 331. 1963; Maheshwari, Fl. Delhi 276 & 280. 1963; Pearce, New High-lights Fls. 8. 1963; Pearce, Seeds Plants 1963: 13. 1963; Piringer, Downes, & Borthwick, Am. Journ. Bot. 50: 86—90 & 1055. 1963; Prain, Bengal Pl., imp. 2, 1: 66 (1963) and imp. 2, 2: 624. 1963; Schmelzer, Phytopath. Zeitschr. 46: [235]. 1963; E. L. D. Seymour, New Gard. Encycl., ed. 6, 154, 230, & 1279. 1963; Sharma & Mukhopadhyay, Journ. Genet. 58: 359, 370—371, 375, 377, 380, 383, & 384, pl. 11, fig. 42—45 & pl. 12, fig. 46—48. 1963; E. B. Anderson in Anderson, Balf., Fish, Wallis, & Finnis, Oxford Book Gard. Fls., imp. 2, 171 & 203, pl. 171, fig. 5. 1964; Cave, Ind. Pl. Chromos. Numb. 2: 330. 1964; R. Good, Geogr. Flow. Pl. 134. 1964; Kelway, Seaside Gard., imp. 2, 49, 138, 169, & 201. 1964; C. E. Lewis in Florists Publ. Co., New Pronounc. Dict. Pl. Names 14. 1964; Lord, Shrubs Trees Austral. Gard., ed. 2, 254. 1964; R. A. Ludwig, Ind. Sem. Canada Dept. Agr. 1964: 7. 1964; Melchior in Engl., Syllab. Pflanzenfam., ed. 12, 2: 437. 1964; Menninger, Seaside Pl. 91, 268, & 288. 1964; Mold., Biol. Abstr. 45: 3521. 1964; Pearce, Seeds Plants Gard. Aristoc. 8. 1964; Santapau, Excerpt. Bot. A.7: 16. 1964; E. L. D. Seymour, New Gard. Encycl., ed. 7, 154, 230, & 1279. 1964; Sharma, Bull. Bot. Surv. India 6: 101. 1964; Yotaro, Gard. Pl. World 2: 49, pl. 25, fig. 2. 1964; Airy Shaw, Kew Bull. Misc. Inf. 1965: 266. 1965; F. A. Barkley, List Ord. Fam. Anthoph. 76, 143, & 149. 1965; Boss, Handb. Shrubs 9, 17, 36, 104, & 122. 1965; J. & L. Bush-Brown, Am. Gard. Book, ed. 4, 252, 269, & 378. 1965; Dakshini, Journ. Indian Bot. Soc. 44: 416 & 419. 1965; Garibaldi, Atti Giorn. Stud. Prop. Spec. Legn. Pisa 1964: 145—154. 1965; R. E. & C. R. Harrison, Trees Shrubs 47, pl. 127. 1965; Hoag, Trees Shrubs North. Plains 203, 205, & 206. 1965; Maheshwari & Singh, Dict. Econ. Pl. India 35. 1965; Mold., Résumé Suppl. 12: 7. 1965; P. K. K. Nair, Asia Monogr. India 1 (5): [Pollen Grains W. Himal. Pl.] 35 & 97, pl. 12, fig. 154. 1965; Ohwi, Fl. Jap. 763 & 766. 1965; N. Taylor, Guide Gard. Shrubs Trees 335, opp. 342, & 432, fig. 8. 1965; Wu, Act. Phytotax. Sin. 10: 56. 1965; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 7, 119, 205, 700, & 1177. 1966; A. W. Anderson, How We Got Fls., imp. 2, 213 & 271. 1966; G. L. Davis, Syst. Embryol. Angiosp. 271. 1966; Erdtman, Pollen Morth. Pl. Tax., ed. 2, 448. 1966; Everett, Reader's Digest Compl. Book

Gard. 115, 114, 120, 660, & 681. 1966; Giraud, Bull. Soc. Hort. Fr. 139 [Jard. Fr. 10 2(F)]: 374. 1966; Hellyer, Shrubs Colour 24—25 & 27. 1966; Matthew, Bull. Bot. Surv. India 8: 164. 1966; Mold., Résumé Suppl. 13: 5. 1966; G. Taylor, Ind. Kew. Suppl. 13: 25. 1966; DeWit, Pl. World High. Pl. 2: 185. 1967; Doolittle & Tiedebohl, Southwest. Gard., ed. 2, 171. 1967; Glasau, Sommergr. Ziergeh. 67. 1967; Gupta, Season. Fls. Indian Summer Resorts Moos. 67 & 81. 1967; Harlan & Jenkins, Biol. Abstr. 48: 5997—5998. 1967; Harlan & Jenkins, U. S. Dept. Agr. Bur. Pl. Ind. Pl. Disease Reporter 51: 103—105. 1967; Hyland, U. S. Dept. Agr. Pl. Invent. 169: 41. 1967; Jaycox, Journ. Kans. Entom. Soc. 40: 124—126. 1967; Kramer, Taxon 16: 239. 1967; E. Lawrence, South. Gard., ed. 2, 171, 183, & 216. 1967; Mitra, Elem. Syst. Bot. Angiosp., ed. 2 abrdgd. ed., 141. 1967; Mold., Résumé Suppl. 15: 14. 1967; Pal & Krishnamurthi, Flow. Shrubs 21—22, 132, 133, & 146. 1967; Pande, Bull. Dept. Med. Pl. Nepal 1: 36. 1967; Patzak & Rech. in Rech., Fl. Iran 43: 1 & 8. 1967; R. R. Stewart, Pakist. Journ. Forest. 17: 515. 1967; Tingle, Check List Hong Kong Pl. 38. 1967; W. Trelease, Wint. Bot., ed. 3, imp. 2, 323 & 334. 1967; Wayside Gardens, [Catalogue] 1967: 137 & 224. 1967; Wils. & Bell, Fragrant Year 187. 1967; E. B. Anderson in Anderson, Balf., Fish, Wallis, & Finnis, Oxford Book Gard. Fls., imp. 3, 171 & 203, pl. 171, fig. 5. 1968; Cathey, Proc. Am. Soc. Hort. Sci. 93: 693—698. 1968; Deb, Sengupta, & Malik, Bull. Bot. Soc. Beng. 22: 199 & 210. 1968; Encke, Schönst. Kalt Warmhauspfl. 393. 1968; Hyland, U. S. Dept. Agr. Pl. Invent. 172: 19, 108, & 118. 1968; Jaitly, Guignard, & Mestre, Comp. Rend. Acad. Sci. Paris D.267: 59—61, fig. 1—13, & pl. 1, fig. 1—4. 1968; A. Löve, Taxon 17: 203 & 576. 1968; McGinnies, Goldman, & Paylore, Deserts World 481. 1968; Mold., Résumé Suppl. 16: 9 & 19 (1968) and 17: 7. 1968; A. & I. Nehrling, Easy Gard. Drought-Resist. Pl., imp. 1, 166 & 169. 1968; Schmeltzer & Schmidt, Phytopath. Zeitschr. 62: [105], 106, 108, 124, & 125. 1968; Sherck & Buckley, Ornament. Shrubs Canada 52. 1968; Stucchi, FIORI 11: 129. 1968; W. Trelease, Pl. Mat. Decorat. Gard. Woody Pl., ed. 5, imp. 2, 145. 1968; Watling, N. Zeal. Pl. Gard. 7: 252. 1968; Anon., Biol. Abstr. 50 (22): S.30. 1969; Bolkh., Grif, Matvej., & Zakhar., Chromos. Numb. Flow. Pl., imp. 1, 714. 1969; Coats, Pl. Hunting 106. 1969; L. T. Evans, Introd. Flowering 460. 1969; Fogg, Concise Guide Shrubs 30 & 31. 1969; Hay & Syngé, Color. Dict. Fls. Pl. Home 187 & 188, pl. 1496 & 1497. 1969; J. Hutchins., Evol. Phytol. Flow. Pl. Dicot. 473 & 674. 1969; Kapoor, Singh, Kapoor, & Srivastava, Lloydia 32: 303. 1969; Plowden, Man. Pl. Names 247. 1969; Rau, Bull. Bot. Surv. India 10, Suppl. 2: 61. 1969; Sahni, Indian For. 95: 334 & 346. 1969; Schmeltzer & Schmidt, Hort. Abstr. 39: 135. 1969; Suwal, Fl. Phulch. Godaw. 89. 1969; Syngé, Suppl. Dict. Gard., ed. 2, 227 & 239. 1969; Widder, Excerpt. Bot. A.14: 159. 1969; Barbey, Arbor. Ornament., ed. 4, 65 & 72. 1970; Bean, Trees Shrubs Hardy Brit. Isls., ed. 8, 1: 517—519, pl. 30. 1970; Cathey, Hort. Abstr. 40: 185. 1970; El-Gazzar & Wats., New Phytol. 69: 469, 473, 483, & 485. 1970; Farnsworth, Pharmacog. Titles 5 (11): iv & item 14140.

1970; Franch., Pl. David., imp. 2, 1: 231. 1970; Grubov, Ivanina, & Tscherneva, Pl. Asiat. Cent. 5: 6—8. 1970; Kelway, Garden. Coast 166 & 174. 1970; McGourty, 1200 Trees [Plants Gard 26 (2):] 65. 1970; R. J. Moore, Reg. Veg. 68: 71. 1970; "A. R.", Biol. Abstr. 51: 13600. 1970; Rouleau, Guide Ind. Kew., imp. 1, 36 & 352. 1970; Schmelzer, Phytopath. Zeit. 67: [285], 292, 293, & 321—326. 1970; E. L. D. Seymour, New Gard. Encycl., ed. 8, 154, 230, & 1279. 1970; D. R. W. Alexander, Hong Kong Shrubs 21. 1971; Angely, Fl. Anal. Fitogeogr. S. Paulo, ed. 1, 841. 1971; Aschersleben, Hort. Abstr. 41: 206. 1971; Brandis, Indian Trees, imp. 5, 502 & 512—513. 1971; Erdtman, Pollen Morph. Pl. Tax., ed. 3, 448. 1971; Farnsworth, Pharmacog. Titles 5, Cumul. Gen. Ind. 1971; Lawrence, Taxon. Vasc. Pl., imp. 2, 688. 1971; Mold., Fifth Summ. 1: 267, 269—272, 282, 287, 292—294, 307—309, 313, 354, 356, 408, 444, 445, 422, 423, 443, 444, 446, 452, 461, & 462 (1971) and 2: 571—573, 575, 641, 727, 734, 773, 856, 971, & 972. 1971; Mold., Phytologia 20: 487 & 505 (1971) and 22: 6. 1971; Mukhopadhyay, Pollen Morph. Verb. [thesis]. 1971; Schmelzer, Hort. Abstr. 41: 206. 1971; Wyman, Gard. Encycl., imp. 1, 140, 191, 766, & 1024 (1971) and imp. 2, 140, 191, 766, & 1024. 1972; E. B. Anderson in Anderson, Balf., Fish, Wallis, & Finnis, Oxford Book Fls., imp. 4, 171 & 203, pl. 171, fig. 5. 1972; Anon., Commonw. Myc. Inst. Index Fungi 3: 823. 1972; Anon., U. S. Dept. Agr. Pl. Sci. Res. Div. Home Gard. Bull. 181: 2 & 20. 1972; R. Bailey, Good Housekeep. Illust. Encycl. Gard. 4: 502 (1972) and 15: 2303. 1972; Crockett, Flow. Shrubs 100. 1972; Encke & Buchheim in Zander, Handwörterb. Pflanz., ed. 10, 158, 537, & 539. 1972; Gamble, Man. Indian Timb., ed. 2, imp. 3, 524 & 544. 1972; Gill, Biol. Abstr. 54: 3419—3420. 1972; Gill, Bull. Torrey Bot. Club 99: 36—38. 1972; Hara, Enum. Sperm. Jap., imp. 2, 1: 186—187. 1972; Hocking, Excerpt. Bot. A. 21: 30. 1972; Huang, Pollen Fl. Taiwan 242 & 243, pl. 162, fig. 4—6. 1972; Mold., Biol. Abstr. 54: 6295. 1972; Mold., Phytologia 23: 453 & 505. 1972; F. Perry, Fls. World 304 & 313. 1972; Queens Bot. Gard. Soc., Pl. Seaside Gard. 1. 1972; Queens Bot. Gard. Soc., Shrubs Area [2]. 1972; Rouleau, Taxon Index 1: 72. 1972; V. & H. Singh, Journ. Bombay Nat. Hist. Soc. 69: 356. 1972; Skinner, Ornament. Pl. Coast. Northw. 75. 1972; R. R. Stewart, Annot. Cat. in Nasir & Ali, Fl. West. Pakist. 605. 1972; Wyman, Arnoldia 32: 36. 1972; Thanikaimoni, Inst. Franç. Pond. Trav. Sect. Scient. Techn. 12 (1): 47 (1972) and 12 (2): 27. 1973; Airy Shaw in J. C. Willis, Dict. Flow. Pl., ed. 8, 122, 210, 718, & 1207. 1973; Anon., Biol. Abstr. 56 (3): B.A.S.I.C. S.39 (1973) and 56 (10): B.A.S.I.C. S.42. 1973; Anon., Ind. Sem. Agrartud. Egyet. G8d8118 [Hungary] 1973: 19. 1973; Farnsworth, Pharmacog. Titles 8 (7): iii & 564. 1973; Gamble, Man. Indian Timb., ed. 2, imp. 3, 544. 1973; Hegnauer, Chemotax. Pfl. 6 [Chem. 21]: 658 & 666. 1973; Hosozawa & al., Phytochem. 12: 1833—1834. 1973; Huxley, Hardwicke, & Toogood, Decid. Gard. Trees 30, 151, & 211. 1973; Leigh & Boden, Convent. Internat. Trade Endang. Sp. 14 & 69. 1973; Mold., Biol. Abstr. 56: 1243 & 5366. 1973; Mold., Phytologia 25: 504 (1973) and 26: 177 & 501. 1973; Schuler,

Gardn. Basic Book Trees Shrubs 234 & 312. 1973; Seabrook, Shrubs Gard., imp. 1, 11, 16, 39, 110, & [145]. 1973; Wedge, Pl. Names, ed. 1, 3 (1973) and ed. 2, 3. 1974; Anon., Biol. Abstr. 57 (5): B.A.S.I.C. E.45. 1974; L. H. & E. Z. Bailey, Hortus Sec., imp. 18, 145. 1974; Bolkh., Grif, Matvej., & Zakhar., Chromos. Numb. Flow. Pl., imp. 2, 714. 1974; El-Gazzar, Egypt. Journ. Bot. 17: 75 & 78. 1974; Farnsworth, Pharmacog. Titles 9 (3): v (1974) and 9 (8): ii. 1974; "N. F. G.", Biol. Abstr. 57: 2962. 1974; Gibbs, Chemotax. Flow. Pl. 3: 1752—1754. 1974; Harkness, Seedlist Handb. 44. 1974; Hersey, Flow. Shrubs Small Trees 50, fig. 109. 1974; Hocking, Excerpt. Bot. A.23: 291 & 293. 1974; Hosozawa & al., Phytochem. 13: 1019—1020. 1974; Hosozawa & al., Tetrahyd. Let. 43: 3753—3754. 1974; Howes, Dict. Useful Pl. 24 & 48. 1974; A. Løve, Taxon 27: 385. 1974; Mold., Phytologia 28: 443, 444, 446, 448, & 507. 1974; F. Perry, Compl. Guide Plants Fls. pl. 418. 1974; Troncoso, Darwiniana 18: 408. 1974; Wilder, Frag. Gard. 113 & 385. 1974; Asher, Guide Bot. Period. 1: 608. 1975; Kelway, Gard. Sandy Soil 42 & 135—136. 1975; Kooiman, Act. Bot. Néerl. 24: 464, 465, & 467. 1975; Mold., Phytologia 31: 390, 391, & 412. 1975; A. & I. Nehrling, Easy Gard. Draught-Resist. Pl., imp. 2, 166 & 169. 1975; Seabrook, Shrubs Your Gard., imp. 2, 11, 16, 39, 110, & [145]. 1975; Whitlock & Rankin, Dried Fls. 21 & 27. 1975; L. H. & E. Z. Bailey, Hortus Third 1149. 1976; Cleene & DeLey, Bot. Rev. 42: 412 & 452. 1976; Gault, Color Dict. Shrubs pl. 53. 1976; A. L. Mold., Phytologia 33: 303. 1976; Mold., Phytologia 33: 507 (1976) and 34: 272 & 500. 1976; Thanikaimoni, Inst. Franç. Pond. Trav. Scient. Techn. 13: 50, 328, & 383. 1976; Babu, Herb. Fl. Dehra Dun 395 & 396. 1977; Balakrishn., Bull. Bot. Surv. India 16: 169—173. 1977; Erdtman, Pollen Morph. Pl. Tax., ed. 3, 448. 1977; Mold., Phytologia 35: 507 (1977) and 36: 39 & 502. 1977; Prance & Elias, Extinct. Forever, imp. 1, 416. 1977; Speta, Candollea 32: 146 & 155. 1977; Troth & Nicolson, Phytologia 35: 225 & 227. 1977; Balakrishn., Biores. Ind. 15 (4): B.137. 1978; Heathcote in Heywood, Flow. Pl. World 237. 1978; Hsiao, Fl. Taiwan 4: [410] & 418—420, pl. 1057. 1978; Layzell & Horton, Canad. Journ. Bot. 56: 1844—1851, fig. 1—14. 1978; Lord, Trees Shrubs Austral. Gard., ed. 5, 254. 1978; Mierow & Shrestha, Himal. Fls. 93. 1978; Mukherjee & Chanda, Trans. Bose Res. Inst. 41: 47. 1978; Prance & Elias, Extinct. Forever, imp. 2, 416. 1978; Wright, Perry, Boyd, & Elsley, Compl. Book Gard. 106, 172, 372, & 386. 1978; Layzell & Horton, Biol. Abstr. 67: 1151. 1979; Milz & Rimoler, Zeitschr. Naturforsch. Wiesb. 346: 325. 1979; G. W. Park, Park's Springtime 1979: 4. 1979; Hsiao, Fl. Taiwan 6: 121. 1980; Lauener, Notes Roy. Bot. Gard. Edinb. 38: 483. 1980; Mold., Phytol. Mem. 2: 255—259, 271, 276, 277, 281—284, 299, 300, 304, 346, 347, 374, 378, 379, 386, 387, 460—462, & 529. 1980; G. W. Park, Park's Springtime 1980: 4. 1980; Roxb., Hort. Beng., imp. 2, 46. 1980; Mold., Phytologia 45: 343 & 504 (1980), 46: 54 & 505 (1980), 47: 335 & 504 (1981), and 48: 122, 123, 399, & 506. 1981; Brennan, Ind. Kew. Suppl. 16: 58. 1981; Hickey & King, 100 Fam. Flow. Pl. 346—348. 1981; Hu, Chin. Mat. Med. 182 & 218.

1981; Munz & Slauson, Ind. Illust. Living Things Outside N. Am. 260 & 328. 1981; Pant, Uniyal, & Prasad, Journ. Bomb. Nat. Hist. Soc. 78: 51. 1981; Rouleau, Repert. Nom. Gen. Ind. Kew. 56 & 479. 1981; Mold., Phytologia 50: 258, 416, 417, 422, 424, & 505 (1982) 51: 302 & 488 (1982), and 52: 114. 1982; Weber & Wittman, Phytologia 51: 379. 1982.

Mostly bushes, small soft-wooded shrubs or subshrubs, rarely small trees or even subherbaceous, erect or spreading to rambling or even prostrate, often very fragrant, glabrous or puberulent to incanous-tomentellous or -tomentose; branches mostly few, ascending or rarely prostrate; twigs slender, round in cross-section or very obscurely tetragonal; pith relatively large, rounded, white, continuous; leaves simple, deciduous, decussate-opposite or ternate, exstipulate, usually glanduliferous; petioles very slender, mostly short; leaf-blades chartaceous, mostly rather small, linear to ovate, marginally entire to dentate or serrate, mostly apically acuminate, sometimes obtuse, often minutely punctate with glistening yellow punctiform glands; inflorescence mostly axillary or running into a terminal thyrs, cymose or corymbose, the cymes opposite, few- to many-flowered, rarely 1-flowered, often showy, the terminal ones sometimes forming a narrow, compound, spike-like panicle, the axillary ones short and often sessile; bracts small to minute or even absent; flowers relatively small, short-pedicellate or subsessile, complete, perfect, zygomorphic; calyx inferior, gamosepalous, campanulate, mostly subactinomorphic, usually deeply 5-lobed or 5-fid, rarely 4- or 6-lobed, persistent & somewhat accrescent in fruit, the lobes lanceolate to triangular, subequal, apically acute, usually 2 anterior, 2 lateral, and 1 posterior, valvate in bud; corolla gamopetalous, tubular or infundibular to hypocrateriform, zygomorphic, mostly surpassing the calyx, usually blue, purple, or violet to rose, rarely white, cochlear in prefloration, usually 5- [rarely 4-] lobed, usually bilabiate, the tube short, cylindric, equaling or surpassing the calyx-tube, the limb spreading, subequally 5-lobed or [usually] the lobes quite unequal, alternate to the calyx-lobes, the upper lip either composed of 3 or 4 subequal erect lobes and the lower lip larger, spreading and incurved, or else the lower lip even larger, innermost in prefloration, concave or cucullate, 3-lobed, with the middle lobe slightly larger, patent, and usually apically crisped, emarginate, toothed, or fimbriate, sometimes entire, the 2 posterior lobes much shorter, equal, oblong or ovate to obovate, flat, spreading; stamens 4, didynamous, inserted below the middle or in the upper part of the corolla-tube, alternate with the anterior and lateral corolla-lobes, the anterior pair longer, involute in bud, exserted in anthesis; filaments separate, filiform throughout or basally thickened; anthers terminal, bilocular, subrotund, the thecae short, parallel or often basally divaricate, apically united or divergent, introrse, the connective inconspicuous; pistil one, superior, compound, regularly bicarpellary or often [abnormally] tricarpellary, elongate, the third carpel, when present, rolled up between the other two; style filiform, elongate, api-

cally bifid, the branches short, unequal, apically stigmatiferous, the shorter one posterior, often surpassing and curving above the anthers or else shorter than the stamens (probably depending on developmental age); ovary single, superior, compound, ellipsoid or subglobose, 4-lobed, externally glabrous or pubescent, imperfectly 4-locular or sometime unilocular with 2 lateral parietal placentae, each 2-lamellate and 2-ovulate, or, when 4-locular, each locule 1-ovulate; ovules pendulous, lateral, apically attached, semi-anatropous, the chalaza superior, the micropyle inferior; fruit capsular or rarely subdrupaceous when immature with a thin fleshy pericarp, small, globose, shorter than and enclosed by the persistent fruiting-calyx, usually dry on maturity and with 4 concave valves, separating into 4 nutlets, the valves basally dehiscent, one of each pair inwardly curved and placentiferous and marginally seed-bearing; nutlets 1-seeded, dorsally compressed and with one margin alate, ventrally concave, centrally unequally carinate, with no central axial cavity present; cotyledons 2, thick, elliptic; radicle inferior; endosperm absent.

Type species: Caryopteris mongholica Bunge.

A rather small genus of about 23 accepted taxa, along with a few cultivars, native to the lower Himalayan or subhimalayan region of Pakistan, Nepal, Bhutan, Tibet, India, and Burma, north into China and Mongolia, and east to Korea, Taiwan, Japan, and Thailand. Several species are cultivated for ornament either in their original form or as cultivars.

Pal & Krishnamurthi (1967) comment that "Caryopteris species are natives of East Asia and have their widest distribution in China and Japan. In India they are fully adapted to grow in the plains and it is common to find them in the shrubberies....[They] respond favourably to sunny locations and a light, well-drained soil."

The accepted generic name, Caryopteris, is derived from the Greek, karyon, a nut, and pteron, a wing, in allusion to the winged nutlets. Bentham (1876) refers to it as a genus of "4 or 5" species, while Clarke (1885), Durand (1888), Briquet (1895), and Parker (1924) give 5 as the number of species, which, they say, are all native to Mongolia, China, Japan, and the Himalaya region of India. Baillon (1891) gives "5 or 6" as the number of species, all from "central Asia and Japan"; Ohwi (1965) recognized 10 species; Sastri (1950) raised the count to 12, while Encke (1960), Airy Shaw (1973), and Hsiao (1975) recognize 15 in all. It is the type genus of Subfamily Caryopterioideae Briq., Tribe Caryopterideae (Schau.) Mold., and Subtribe Caryopterideae Schau.

Briquet (1895) divides the genus into two sections:

Section 1. Mastacanthus (Endl.) Briq., with the anterior lip of the corolla ciliate-dentate or fimbriate and the anther-thecae parallel or basally slightly divergent, including what he calls C. divaricata, C. incana, C. mongholica, C. nepetaefolia, and C. tangutica.

Section 2. Pseudocaryopteris Briq., with the anterior lip of the corolla merely crisped and the anther-thecae apically (instead

of basally) divergent, including what he calls C. grata, C. paniculata, and C. wallichiana.

Loureiro's original (1790) description of the synonymous genus Barbula is: "Cal. Perianthium 5-fidum: laciniis acutis, erectis, aequalibus. Cor. Ringens, tubo calyci aequali: limbo 5-fido, laciniis 4 lobii superioris ovatis, erectis, sub-aequalibus: labium inferus magnum, patens, incurvum, terminatum fimbria longa, capillari. Stam. Filamenta 4, erecta, quorum 2 longiora, corollam superantia. Antherae sub-rotundae. Pist. Germen sub-rotundum, 4-sulcum. Stylus 2-fidus, brevior staminibus. Stigmata simplicia. Peric. Nullum. Calyx connivens. Sem. 4, sub-rotunda, nuda. Nom. Barbulam dixi a fimbria barbata labii inferiora. Char. Gener. Cor. Labium inferius magnum, fimbriatum: superius 4-fidem, laciniis ovatis." The type species is Barbula sinensis Lour. [= Caryopteris incana f. candida (Schelle) Hara].

The generic name, Mastacanthus, was originally proposed by Endlicher in 1838 as a new name for the Barbula of Loureiro (1790) which is a homonym of the moss genus Barbula of Hedwig (1782), so its typification is the same as that given above for Loureiro's genus. Bocquillon (1863) comments that "Le genre Mastacanthus Endl. a été réuni avec raison au genre Caryopteris Bge. dont il ne diffère que par des caractères qui sont tout au plus spécifiques. Nous croyons devoir y joindre le genre Glossocarya Wall. L'espèce G. mollis, ne diffère du C. mongolica que par son calice plus tubuleux et blissé, par sa corolle à gorge moins dilatée, par les divisions plus grandes de son style, caractères qui ne tiennent qu'à une légère modification dans la forme, et ne suffisent pas pour constituer un genre différent des Caryopteris." None the less, the two genera are kept separate by practically all other workers in the group and certainly habitually seem to me to be very distinct. Both Glossocarya Wall. and Caryopteris Bunge are placed with Hymenopyramis Wall., Peronema Jack, Carrettia Fletcher, and Petraeovitex Oliv. in the Tribe Caryopterideae.

Clarke (1885) asserts that "Though the genus is near Clerodendron, two of the Indian species are easily distinguished by their very short corolla: the third, C. Wallichiana, has the corolla-tube scarcely 1/5 in. [long]. The capsule is hardly less succulent than in several species of Clerodendron, nor is the incurving of the edges of the valves different from what occurs in that genus."

Dahlgren (1938) and Junell (1934) place Caryopteris in the Lamiaceae or mint family, Junell stating that "Caryopteris [ist] sehr bahe mit Amethystea verknüpft, einem einjährigen Kraut, das sicher eine verhältnismässig zentrale Stellung in Ajugeae einnimmt." He says, further, that the so-called Subfamily Caryopterioideae is an unnatural group of genera and should be divided among the Viticeae of the Verbenaceae and the Ajugeae of the Lamiaceae and that both Caryopteris and Glossocarya are closely related to Amethystea, a monotypic genus inhabiting the central Asiatic area from Iran to

Mongolia. Certainly the species of the Mastacanthus section of Caryopteris do bear a striking habitual similarity to Amethystea, but the Pseudocaryopteris group of taxa do not.

Bentham (1876) comments that the "Species omnes a Schauero in genus unicum junctae, etsi in typicis corollae lobus anticus fimbriatus et antherarum loculi paralleli v. vix divergentes, dum in Himalaica lobus anticus corollae margine crispulus tantum et antherarum loculi mox divaricati apice confluentes. Fructus ante maturitatem praesertim in C. grata subdrupaceus, pericarpio tenuiter succusa, maturus tamen in valvas 4 pyrenas auferentes dehiscens."

Meisner (1877) divides Caryopteris into three divisions:

- (1) Eucaryopteris — "Corolla cyanea fauce villis clausa lobis 4 acutis ovatis, quinto infimo majore fimbriato. Antherae loculis parallelis stylusque ramis longis longe exserta, filamentis rectis. Folia lanceolata acuta integra" (including what he calls C. mongholica Bunge and C. wallichiana Schau.).
- (2) Mastacanthus — "valvae coriaceae obovoideae, profunde naviculares marginibus introflexis, ventre areola brevior et angustiore depressa instructae, quae clausa est pseudosepta longitudinaliter carinato apice adnato ceterum demum circumcirca soluto. Semen infra apicem pseudosepti affixum late obovoideum. Placenta et gynobasis praecedentis" (including only what he calls C. incana Miq.).
- (3) Phasianurus — "(ex nomine japonico, ob genitalia arcuata longe exserta). Calyx fructifer late campanulatus patens. Valvae Mastacanthi, sed crasse coriaceae, areola ventrali dimidio minore valde impressa, pseudosepto placenta et semine ut in Mastacantho sed tota caryopsis processu filiformi elastice cartilagineo ab ipsa basi pseudosepti exeunte gynobaseos apice affixa. Gynobasis caryopsibus fere triplo brevior, constans e tuberculis conicis minutis 2, inter bases caryopsidum positas, et cruciatim cum his ex lamellis majoribus subcoriaceis 2 ovalibus, quorum margines exteriores incrassati per longitudinem foveant processus elasticos caryopsidum apicibus lamellarum insertos, margines interiores autem inter caryopsides inseruntur (fructus ad C. divaricatam descriptus)." Herein he includes what he calls C. divaricatus S. & Z. and C. nepetaefolia Benth.

Common and vernacular names listed for the genus as a whole are "Bartblume", "Blaubart", "bluebeard", "blue mist", "blue spirea", "caryoptère", "verbena shrub", and "verbena-shrub". Carleton (1959) avers that the name, "bluebeard", applies also to Clintonia borealis, but this is not strictly true — the latter plant is known as "bluebead", from the shape and color of its mature fruit (not "bluebeard").

Bailey (1972) notes that the wood of cultivated species of Caryopteris is winter-killed when the temperature falls below 20° F. The stems and/or branches should then be cut back to stubs a few inches above the ground level in the following spring (perhaps about late March or early April in the Northern Hemisphere, depend-

ing on the region) or when basal shoots begin to appear. Blooms will then be produced on new wood in late summer. The cultivated taxa are easy to grow as pot plants in a cool greenhouse and they are useful outdoors in a border as well (for the low-growing taxa) or in background shrubberies (for the taller species), but there require a well-drained, light, sandy-loam soil in a sunny position. They may be propagated by seeds or cuttings (the latter only in the case of forms and cultivars). In the United States they are hardy in Life Zone 7, root-hardy in Zone 3, and top-hardy to Zone 6. In the New York City area they usually bloom from August to frost. Mostly they are useful also as bee-plants for apiarists. Cuttings made from young growth root easily in sand in summer and early autumn. In 1954 2—3-foot plants sold for \$2.75 each in the U.S.A.; in 1961 18-inch 2-year-old plants were selling for \$1.45 each or 10 for \$12.

Gibbs (1974) reports tannins and cyanogenesis absent in the genus, while leucoanthocyanin is "doubtfully present".

DeWit (1967) tells us that the genus is reported to be "useful" as an aphrodisiac. Some species are used in India and elsewhere to form hedges or as ornamental garden plants, as personally observed by my wife and myself in New Delhi.

Erdtman (1945) has described the pollen morphology of ten species. He notes that its characters suggest the genus Amethystea and that both genera rightfully belong in the Verbenaceae. He maintains that Amethystea and Caryopteris should not be placed in the Lamiaceae, as was recommended by Junell (1934), since to do so would "lessen the striking similarity in pollen morphology in that family".

Members of the genus Caryopteris are quite often attacked by the parasitic fungi, Cercospora caryopteridis and Metasphaeria casaresiana. Schmelzer (1970) reports attacks by the cucumber mosaic virus on C. Xclandonensis Simmonds, while Schmelzer & Schmidt (1968) found alfalfa mosaic attacking C. incana (Thunb.) Miq. Jaycox (1967) reports Anthidium manicatum L., a hymenopteron native to Europe, attacking the roots of Caryopteris at Ithaca, New York, in 1963. Wilson & Hedden (1962) and Harlan & Jenkins (1967) found the roots attacked by the nematode, Meloidogyne hapla Chitwood, producing a form of "root-knot". Control can be effected by the use of the nematocide, Cynem, at 750—1150 ppm or 17.3 percent of DBCP (nemagon). In plots where root-knot control was good the percentage of plants which survived the following winter ranged from 50—90 percent. Where the nematode control was poor, winter-killing was severe, and survival was as low as 9 percent in untreated plots.

It may be worth noting here that the Franchet & Savatier work (1875) listed in the bibliography (above) is sometimes cited as "l: 257" and "l: 260", but the items concerning Caryopteris actually occur on pages 357—358 and 360. The Maximowicz (1882) reference is often erroneously cited as "1881", the titlepage date, for instance by Jackson (1893) and Grubov & al. (1970), but the

pages here concerned were not actually issued until January 21, 1882. Similarly, his 1886 work is also often cited by the title-page date of "1887", but pages 12--121 were actually issued on April 15, 1886.

The Schnitzlein reference in the bibliography (above) is also often cited by the titlepage running-date of "1843-1870", but the verbenaceous portion was issued in 1856. Similarly, the Endlicher reference is often cited as "1836-1856" or as "1839" (for instance, by Rehder, 1942), but the actual date of issuance of the pages here involved is 1838. Diels (1902) cites Maximowicz's *Mél. Biol.* 9: 828--830 reference as "1876", but the actual date of publication was 1877. The Angely (1971) work is often incorrectly cited as "1970". Bocquillon (1862) cites the Roxburgh, *Hortus Bengalensis* work as "Hamilton in Roxb. Hort. Beng."

The W. L. Hunt s.n. [8/17/36], distributed as Caryopteris sp., actually represents a species of Buddleia in the Loganiaceae.

A list of Excluded Species:

Caryopteris esquirolii Léveillé, Feddes Repert. Spec. Nov. 9: 449.

1911 = Pogostemon glaber Benth., Lamiaceae.

Caryopteris fluminis Léveillé, Sert. Yunnan 3. 1916 = Colquhounia seguini Vaniot, Lamiaceae.

Caryopteris glossocarya Bocq. in Baill., *Adansonia*, ser. 1, 2: 111, pl. 19. 1862; Rev. Verbénac. 111, pl. 19. 1863 = Glossocarya mollis Wall.

Caryopteris mairei Léveillé, Sert. Yunnan 3. 1916; Cat. Pl. Yunnan 277 & 298. 1917 = Teucrium palmatum Benth., Lamiaceae.

Caryopteris ? ningpoensis Hemsl., Journ. Linn. Soc. Lond. Bot. 26: 264--265. 1890 = Elsholtzia sp., Lamiaceae.

Caryopteris parvifolia Batalin, Act. Hort. Petrop. 13: 98. 1893 = Plectranthus parvifolius (Batalin) W. A. Talbot, Lamiaceae.

Caryopteris serratum (L.) Moon ex Mold., Phytol. Mem. 2: 379, in syn. 1980 = Clerodendrum serratum (L.) Moon

P'ei (1932), in his excellent monograph of the Verbenaceae of China, gives the following key to the taxa of Caryopteris recognized by him:

1. Inflorescence without bracts or bracteoles, in many-flowered cymes; the lower corolla-lobe toothed or fimbriate; leaves usually mealy-white beneath.
2. Leaves entire, linear or ovate-oblong.
 3. Ovary glabrous; lower corolla-lobe strongly fimbriate....
C. mongholica.
 - 3a. Ovary pubescent; lower corolla-lobe toothed or shortly fimbriate.
 4. Leaves linear, glutinous, with black veins beneath; corolla purplish-blue.....C. glutinosa.
 - 4a. Leaves ovate-oblong, not glutinous, without black veins beneath; corolla greenish-yellow.....C. forrestii.
 - 2a. Leaves serrate or lobed, lanceolate-ovate.
5. Ovary glabrous.
 6. Leaves serrate, ovate, basally subcordate or truncate to

- rotundate; corolla-lobes with long villous hairs.....
C. trichosphaera.
- 6a. Leaves lobed, lanceolate, basally cuneate to rotundate;
 corolla-lobes appressed-villous.....C. tangutica.
- 5a. Ovary pubescent.....C. incana.
- 1a. Inflorescence with bracts and bracteoles, in 1- to many-
 flowered cymes and panicles; lower corolla-lobe entire;
 leaves usually green on both surfaces.
7. Inflorescence cymose, usually —few-flowered, axillary or
 subterminal.
8. Plants creeping; flowers showy, usually solitary in the
 leaf-axils; corolla-tube usually 4 mm. long.....
C. nepetaefolia.
- 8a. Plants erect; flowers usually in few-flowered cymes;
 corolla-tube usually 9 mm. long.....C. terniflora.
- 7a. Inflorescence paniculate, usually many-flowered, axillary
 or terminal.
9. Inflorescence in axillary panicles, reddish.C. paniculata.
- 9a. Inflorescence terminal or subterminal, not reddish.
10. Calyx 5-toothed, the teeth short, not over 1 mm. long;
 leaf-base more or less cordate; corolla white.
11. Branches and inflorescence villous.... C. divaricata.
- 11a. Branches and inflorescence hirsute and glandular....
C. siccanca.
- 10a. Calyx 6-lobed, the lobes lanceolate, 4 mm. long, 1-3-
 ridged; leaf-base cuneate; corolla bluish-violet.....
C. odorata.
- A tentative artificial key to the taxa herein accepted by me:
1. Cymes many- or very many-flowered.
2. Inflorescences all axillary, sessile or subsessile, dis-
 tinctly subracemose.....C. paniculata.
- 2a. Inflorescences axillary or terminal, definitely cymose, not
 racemiform.
3. Lower corolla-lip apically trifid, emarginate, or entire.
4. Lower corolla-lip apically emarginate; cymes strictly
 axillary.....C. grata.
- 4a. Lower corolla-lip apically trifid or entire, not emar-
 ginate; cymes axillary and/or terminal.
5. Lower corolla-lip apically trifid.....C. forrestii.
- 5a. Lower corolla-lip apically entire.
6. Cymes dense, usually forming a congested, narrow,
 terminal thyrse; leaf-blades lanceolate, marginally
 serrate to the mid-point or entire.
7. Corolla blue, purple, lilac, or lavender.
8. Leaf-blades marginally serrate.....C. odorata.
- 8a. Leaf-blades marginally entire.C. odorata f. in-
tegrifolia.
- 7a. Corolla white.....C. odorata f. albiflora.
- 6a. Cymes loose, wide-spreading; leaf-blades rather
 broadly ovate (when mature), often serrate almost
 to the base.

9. Cymes mostly axillary or, if terminal, small and merging into the penultimate axillary ones; leaf-blade serration coarse and uneven; native to China, Taiwan, Korea, and Japan.
10. Stems, branches, peduncles, and pedicels glabrous or only sparsely pilose; leaf-blades sparsely pubescent; corolla blue or purple...C. chosenensis.
- 10a. Stems, branches, peduncles, and pedicels densely glandular-hirsute; leaf-blades long-setulose on both surfaces; corolla white.....C. siccanca.
- 9a. Cymes both axillary and regularly forming a very large, loose, wide-spreading, terminal panicle; leaf-blade serration small and uniform; native to Nepal.
11. Mature leaf-blades to 15 cm. long and 10.5 cm. wide.....C. nepalensis.
- 11a. Mature leaf-blades only 4—7 cm. long and 3.2—4.5 cm. wide.....C. nepalensis var. parvifolia.
- 3a. Lower corolla-lip apically fimbriate.
12. Leaf-blades always or usually marginally entire or only irregularly few-toothed.
13. Leaf-blades regularly entire-margined.
14. Leaf-blades linear to linear-oblong, not glutinous nor revolute-margined; ovary glabrous..C. mongholica.
- 14a. Leaf-blades lanceolate, glutinous, marginally revolute; ovary pubescent.....C. glutinosa.
- 13a. Leaf-blades often marginally toothed, the teeth few, scattered, triangular.
15. Corolla blue or bright-blue.....C. Xclandonensis.
- 15a. Corolla deep-blue..C. Xclandonensis cv. Heavenly Blue
- 12a. Leaf-blades mostly more or less toothed on the margins.
16. Leaf-margins regularly incised-dentate, the incisions antrorse, obliquely broad-based, apically bluntly subacute, and revolute; vein and veinlet reticulation abundant, fine, conspicuously impressed above.....C. incana var. szechuanensis.
- 16a. Leaf-surface and leaf-margin not as described above.
17. Leaf-blades very narrow, to 3 mm. wide, linear to linear-lanceolate.....C. mongholica var. serrata.
- 17a. Leaf-blades not as described above, mostly ovate or ovate-oblong to oblong-lanceolate or ovate-elliptic, mostly 12—30 mm. wide.
18. Corolla white.....C. incana f. candida.
- 18a. Corolla not white.
19. Plants erect in growth.
20. Upper corolla-lobes densely long-villous.....C. trichosphaera.
- 20a. Upper corolla-lobes not long-villous.
21. Corolla blue or violet-blue; growth compact; plants very hardy, 2—3 feet tall; inflorescence scattered.

CARYOPTERIS CHOSENSIS Mold., *Phytologia* 51: 302. 1982.
 Synonymy: Clerodendron divaricatum Sieb. & Zucc., *Abhandl. Akad. Wiss. Muench. Math.-Phys.* 4 (3) [Fl. Jap. Fam. Nat. 2]: 154. 1846 [not Clerodendrum divaricatum Jack, 1820]. Caryopteris divaricata (Sieb. & Zucc.) Maxim., *Bull. Acad. Imp. Sci. St.-Petersb.* 23: 390. 1877. Caryopteris divaricata S. Z. apud Maxim., *Bull. Acad. Imp. Sci. St.-Petersb.* 23: 390. 1877. Cariopteris divaricata Maxim. apud Franch., *Nouv. Arch. Mus. Hist. Nat. Paris*, ser. 2, 6: 111. 1883. Caryopteris divaricata Maxim. apud Forbes & Hemsl., *Journ. Linn. Soc. Lond. Bot.* 26: 263. 1890. Microtaena ? coreana Lévêillé, *Feddes Repert. Spec. Nov.* 9: 223. 1911. Caryopters divaricata (Sieb. & Zucc.) Maxim. ex P'ei, *Mem. Sci. Soc. China* 1 (3): 179, sphalm. 1932. Caryopteris coreana (Lévêillé) Honda, *Siebold-Kenkyu* 579. 1938. Caryopteris coreana Honda ex Mold., *Fifth Summ.* 1: 422, in syn. 1971.
 Bibliography: Sieb. & Zucc., *Abhandl. Akad. Wiss. Muench. Math.-*

Phys. 4 (3) [Fl. Jap. Fam. Nat. 2]: 154. 1846; Miq., Ann. Mus. Bot. Lugd.-Bat. 2: 99. 1865; Miq., Prol. Fl. Jap. 31. 1865; Maxim., Bull. Acad. Imp. Sci. St.-Petersb. 31: 87. 1866; Maxim., Mém. Biol. Acad. Imp. Sci. St.-Petersb. 12: 522. 1866; Franch & Savat., Enum. Pl. Jap. 1: 360. 1875; Iinuma, Somoku Dzusetsu, ed. 1, 11: pl. 38. 1875; Maxim., Bull. Acad. Imp. Sci. St.-Petersb. 23 [Diagn. Pl. Nov. Asiat. Dec. 1]: 389 & 390. 1877; Maxim., Mém. Biol. Acad. Imp. Sci. St.-Petersb. 9: 829 & 830. 1877; Maxim., Bull. Soc. Nat. Mosc. 54: 41. 1879; Franch., Nouv. Arch. Mus. Hist. Nat. Paris, ser. 2, 6: 111. 1883; Franch., Pl. David., imp. 1, 1: 231. 1884; Forbes & Hemsl., Journ. Linn. Soc. Lond. Bot. 26 [Ind. Fl. Sin. 2]: 263. 1890; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 447. 1893; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 178. 1895; Diels, Fl. Cent.-China 550. 1902; Schelle in Beissner, Schelle, & Zabel, Handb. Launholz-Benen. 426. 1903; Léveillé, Feddes Repert. Spec. Nov. 9: 223. 1911; Nakai, Fl. Korea 2: 137. 1911; C. K. Schneid., Illust. Handb. Laubholz. 2: 596. 1911; Makino, Somoku Dzusetsu [Iconogr. Fl. Nipp.], ed. 2, 11: pl. 38. 1912; Matsum., Ind. Pl. Jap. 2 (2): 530—531. 1912; Diels, Notes Roy. Bot. Gard. Edinb. 7: 347. 1913; Makino, Somoku Dzusetsu [Iconogr. Fl. Nipp.], ed. 3, 11: pl. 38. 1917; Nakai, Bot. Mag. Tokyo 35: 205. 1921; Chung, Mem. Sci. Soc. China 1 (1): 228. 1924; Makino, Illust. Fl. Jap. [216]. 1924; Stapf, Ind. Lond. 2: 82 & 238. 1930; P'ei, Mem. Sci. Soc. China 1 (3): 163, 164, & 178—180. 1932; Makino, Gensyoku Yagai-shokubutu [Nature-Col. Wild Pl.] 3: 201. 1933; Terasaki, Nippon Shokubutsu Zufu [Jap. Bot. Illust. Album] fig. 1455. 1933; Tu, Chinese Bot. Dict., abrdgd. ed., 1389. 1933; Crevost & Pételot, Bull. Econ. Indo-chine 37: 1296. 1934; Hand.-Mazz., Act. Hort. Gotob. 9: 69. 1934; Junell, Symb. Bot. Upsal. 1 (4): 115, 116, 118—120, & 131, fig. 182. 1934; Hara, Bot. Mag. Tokyo 51: 52. 1937; Dahlgren, Svensk Bot. Ridsk. 32: 231. 1938; Honda, Siebold-Kenkyu 579. 1938; Makino, Illust. Fl. Nipp. 185, fig. 553. 1940; Terasaki, Nippon Shokubutsu Zufu [Jap. Bot. Illust. Album], ed. 2, fig. 553. 1940; Worsdell, Ind. Lond. Suppl. 1: 190. 1941; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 56, 58, 71, & 87. 1942; Erdtman, Svensk Bot. Tidsk. 39: 282—284, fig. 6. 1945; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 1: 447. 1946; Mold., Alph. List Inv. Names Suppl. 1: 4. 1947; Hara, Enum. Sperm. Jap., imp. 1, 1: 186. 1948; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 131, 134, 157, & 178. 1949; Bean in Chittenden, Roy. Hort. Soc. Dict. Gard. 1: 405. 1956; Ikuse, Polen Grains Jap. 128. 1956; Iljin, Acad. Sci. Bot. Inst. Dept. Repr. Mat. Hist. Fl. Veg. USSR. 3: 216. 1958; Hara, Outline Phytogeogr. Jap. 7. 1959; Hay, Gard. Chron. 145: 411. 1959; Mold., Résumé 168, 171, 172, 214, 249, 250, 262, 320, & 445. 1959; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 447. 1960; Hocking, Excerpt. Bot. A. 4: 592. 1962; Wu, Act. Phytotax. Sin. 10: 56. 1965; Mold., Résumé Suppl. 12: 7 (1965) and 13: 5. 1966; Ohwi, Fl. Jap. 766. 1965; Hyland, U. S. Dept. Agr. Pl. Invent. 172: 108 & 118. 1968; El-Gazzar & Wats., New Phytol. 69: 483 & 485. 1970; Franch., Pl. David., imp. 2, 1: 231. 1970; Mold., Fifth Summ. 1:

287, 307—309, 356, 422, 423, & 443 (1971) and 2: 572 & 856. 1971; Hara, Enum. Sperm. Jap., imp. 2, 1: 186. 1972; Farnsworth, Pharmacog. Titles 8 (7): iii & 564. 1973; Hosozawa & al., Phytochem. 12: 1833—1834. 1973; Anon., Biol. Abstr. 57 (5): B.A.S.I.C. E.45. 1974; El-Gazzar, Egypt. Journ. Bot. 17: 75 & 78. 1974; Farnsworth, Pharmacog. Titles 9 (3): v (1974) and 9 (8): ii. 1974; "N. F. G.", Biol. Abstr. 57: 2962. 1974; Hosozawa & al., Phytochem. 13: 1019—1020. 1974; Hosozawa & al., Tetrahed. Let. 43: 3753—3754. 1974; Asher, Guide Bot. Period. 1: 608. 1975; Kooiman, Act. Bot. Neerl. 24: 464. 1975; Mierow & Shrestha, Himal. Fls. 93. 1978; Lauener, Notes Roy. Bot. Gard. Edinb. 38: 483. 1980; Mold., Phytol. Mem. 2: 276, 299, 300, 346, & 524. 1980; Mold., Phytologia 50: 258 (1982) and 51: 302. 1982.

Illustrations: Iinuma, Somoku Dzusetsu, ed. 1, 11: pl. 38. 1875; Makino, Somoku Dzusetsu [Iconogr. Pl. Nipp.], ed. 2, 11: pl. 38 (1912) and ed. 3, 11: pl. 38. 1917; Makino, Illust. Fl. Jap. [216]. 1924; Makino, Gensyoku Yagai-shokubutu [Nature-Col. Wild Pl.] 3: 201. 1933; Terasaki, Nippon Shokubutsu Zufu [Jap. Bot. Illust. Album] fig. 1455. 1933; Tu, Chinese Bot. Dict., abrdgd. ed., 1389. 1933; Junell, Symb. Bot. Upsal. 1 (4): 119, fig. 182. 1934; Makino, Illust. Fl. Nippo. 185, fig. 553. 1940; Terasaki, Nippon Shokubutsu Zufu [Jap. Bot. Illust. Album], ed. 2, fig. 553. 1940; Erdtman, Svensk Bot. Tidsk. 39: 282, fig. 6. 1945; Hay, Gard. Chron. 145: 411. 1959; Meirow & Shrestha, Himal. Fls. 93 (in color). 1978.

An ill-scented, green, glabrous or thinly pubescent, hardy, perennial herb or subshrub, 0.4—1.8 m. tall; stems tetragonal, green, branched, glabrous; branches divaricate, tetragonal, glabrous or sparsely pubescent; leaves decussate-opposite, strongly scented, the lower ones petiolate, the upper ones sessile; lower petioles to 2 cm. long, upper ones to 3 mm. long, pubescent, sometimes alate; leaf-blades membranous, green, ovate to broadly ovate (lower ones) of lanceolate to oblong (upper ones), [2.5—] 4—15 cm. long, 4—8 cm. wide, apically short-acuminate, marginally coarsely and obtusely or acutely dentate or serrate, basally shallowly cordate to rounded (lower ones) or attenuate (upper ones), sparsely pubescent on both surfaces; secondaries usually 5 per side; inflorescence very laxly paniculate, the cymes axillary in the uppermost leaf-axils or subterminal, loosely few-flowered or many-flowered, divaricate, dichotomous or usually twice trifid and 3—7-flowered, bracteate; peduncles long, slender, about 5.5 cm. long, sparsely pubescent or often scattered glandular-pilose; pedicels filiform, 6—8 mm. long, often scattered glandular-pilose; calyx obconic or cupuliform, 2—3 mm. long, externally sparsely pubescent, internally glabrous, the rim subtruncate or very shortly and minutely 5-dentate, the teeth very small, deltoid, about 0.6 mm. long, apically acute; corolla blue-purple or light-blue to "blue-white", about 1.5 cm. long, externally pubescent, the tube broadly or narrowly cylindric, 8—13 mm. long, slightly exserted from the calyx, internally sparsely pubescent, the limb oblique, the lobes marginally entire.

[to be continued]

BOOK REVIEWS

Alma L. Moldenke

"CRYPTOGAMS: Cyanobacteria, Algae, Fungi, Lichens. Textbook and Practical Guide" by Karl Esser. English Translation of the Revised Text by Michael G. Hackston & John Webster, xi & 610 pp. and 304 b/w fig. & photo. Cambridge University Press, Cambridge, London & New York, N. Y. 10022. 1982. \$74.50.

The original German edition of 1976, "Kryptogamen", from Springer Verlag is now probably the most popular and best prepared text on this part of botany for both the instructors' guidance and the students' growth in scientific content, methods and skills. Consequently it is fortunate to welcome to the English-language colleges and universities the world over this revised translation as either an excellent main text or, more likely, in the United States, a supplementary one. Intentionally neither one of the more recently presented classifications nor a contrasting (and assuredly confusing) medley of recent taxonomic reclassifications has been included. Lapse of some more time will permit a honing of the prospects for this, when the students will be more ready, too. The laboratory sessions and preparation methods are as detailedly presented as is the theoretical section. Color transparencies of most figures are available from V-Dia Verlag in Heidelberg.

"COMETS: Vagabonds of Space" by David A. Seargent, xviii & 234 pp., 15 b/w photo. pl. & 13 fig. Doubleday & Company, Inc., Garden City, New York 11530. 1982. \$15.95.

This book is directed to the amateur astronomer interested in comets which may be "actual portions of the original solar nebula, existing in a relatively unaltered state...[and so] the study of these objects might answer fundamental questions about the origin and evolution of the sun and planets." Chapters describe the nucleus, coma and tail structure of comets, their discovery and orbits, several famous comets with a separate chapter devoted to the most famous of all - Halley's -- and its anticipated re-visit in 1985-1986.

"INTRODUCTORY MYCOLOGY" Third Edition by Constantine J. Alexopoulos & Charles W. Mims, xviii & 632 pp., 374 b/w fig., 314 photo. & 21 tab. John Wiley & Sons, Inc., New York, N. Y. 10158. 1979. \$24.75.

This well-known text succeeds the popular editions of 1952 and

1962. To their emphasis on morphology and taxonomy for this thorough beginning study has been added "some physiological, biochemical, genetic and ecological data." Taxonomy has been updated, out of the plant kingdom phylogeny purposely ignored, illustrations have been enriched with several photographs and electron micrographs. The glossary of mycological terms used is much appreciated because it gives derivations as well as meanings for the terms and then page references. The descriptive text is presented according to taxonomic divisions and their smaller groups and considers the lichenized fungi separately. The illustrations are copious and excellent. The text is printed in easily legible type.

"BIOLOGY OF SPIDERS" by Rainer F. Foelix, vii & 306 pp., 182 b/w fig. & photo. & 4 tab. Harvard University Press, London & Cambridge, Massachusetts 02138. 1982. \$30.00.

This excellent presentation "is meant....for anybody interested in biology, especially for those who already find spiders particularly intriguing creatures" as well as a stimulating modern review for the already knowledgeable arachnologist. It is a fairly close translation of "Biologie der Spinnen" of 1979 with a few new paragraphs, illustrations and findings reported in more recent literature that are, of course, incorporated into the fine bibliography. The introductory chapters present the near ubiquity, the functional anatomy and the basic taxonomy for the 30,000 species in about 60 families. The other main topics considered are metabolism, neurobiology, spider webs, locomotion and prey capture, reproduction, development, and ecology. The author believes that since spiders are diet generalists and typically asocial "that we must discount their ability to control pests, although together with birds and insectivorous mammals, they are certainly among the main foes of insects. Current field work studies in the U. S. northwest might produce a different conclusion. All spiders are carnivorous and the many who ensnare insects with their fibroin silk use a very efficient tool that is as strong as nylon and is quickly recycled with little dependence on body proteins.

"WORLD OF WILDLIFE" by Anthony & Jacqueline Nayman, 336 pp, 350 color photos, 16 relief maps. Facts on File, Inc., New York, N. Y. 10019. 1979. \$24.95.

This is a wonderfully, copiously, effectively illustrated introduction to the major animals, mostly mammals and birds, of the palaearctic, nearctic, neotropical, ethiopian, oriental, australian, antarctic and island regions. These groups are mapped and described with fine zoological, behavioral, ecological and geographical information filling up the parts of the pages that do not bear the beautiful illustrations. A book this good would be

hard to forget: over a dozen years ago I first saw it from some different press.

"INSECTS: Their Ways and Means of Living" by Robert Evans Snodgrass, xi & 362 pp., 14 b/w photos & 186 fig. Dover Publications, Inc., New York, N. Y. 10014. 1980 reprinting, \$2.00 paperbound.

This excellent book was first published by the Smithsonian Institution in 1931 about which time I read it avidly, piecing together stray accumulated facts, verifying or altering nature stories from still longer ago, and just enjoying using the author's sights and insights into this part of the natural world. Even today's modernly trained entomologists, ecologists, etc. should enjoy reading this book, as well as folks just interested in their gardens, the great out-of-doors, etc. Dover first reprinted this book in 1967 unabridged except for the black/white reproduction of the twelve color plates.

"SPLENDID ISOLATION: The Curious History of South American Mammals" by George Gaylord Simpson, ix & 266 pp., 43 b/w fig., 14 tab., & 2 maps. Yale University Press, New Haven, Connecticut 06520. 1980. \$17.50.

This professionally respected author states that "any literate adult with a real interest in South America, in animals, or in evolution can read this account with pleasure and profit." Of course, there is even much more in the book of both pleasure and profit for trained biologists. Both can here follow some of the highlights of "evolution at work for tens of millions of years in the history of South American mammals, and here it turns out that we have been provided with an almost ideal natural experiment." "At present the most probable hypothesis is that marsupials spread between South America and Australia in one direction or the other by way of Antarctica." Anopros SCIENCE 213, p. 234, reports an extinct marsupial fossil in the rocks on Seymour Island that "strengthen[s] proposals that Australian marsupials perhaps originated from South American species that dispersed across Antarctica when Australia still was attached to it." "One of the most extraordinary events in the whole history of life [is] the mingling of advanced North and South American mammals, their interactions, their integration into faunas of different compositions, and finally the establishment of the present faunas of the two continents" -- the Great American Interchange. I hope that these few quoted highlights let the author speak favorably for this excellent book.

747
2
7

PHYTOLOGIA

An international journal to expedite botanical and phytoecological publication

Vol. 52

March 1983

No. 7

FIFTIETH JUBILEE YEAR

CONTENTS

SMITH, L. B., & WASSHAUSEN, D. C., <i>Notes on Begoniaceae—I</i>	441
MOLDENKE, H. N., <i>Additional notes on the genus Caryopteris (Verbenaceae). I</i>	452
TURNER, B. L., <i>A new species of Critonia (Asteraceae-Eupatorieae) from Belize</i>	491
TURNER, B. L., <i>A new species of Lithospermum (Boraginaceae) from near El Salto, Durango, Mexico</i>	493
TURNER, B. L., <i>Two new species of Koanophyllon (Asteraceae-Eupatorieae) from northeastern Mexico</i>	495
<i>Index to authors in Volume Fifty-two</i>	499
<i>Index to supra-specific scientific names in Volume Fifty-two</i>	499
<i>Publication dates</i>	512

LIBRARY

APR 22 1983

NEW YORK

Published by Harold N. Moldenke and Alma L. Moldenke

303 Parkside Road
Plainfield, New Jersey 07060
U.S.A.

Price of this number \$3.00; for this volume \$13.00 in advance or \$14.00 after close of the volume; \$5.00 extra to all foreign addresses and domestic dealers; 512 pages constitute a complete volume; claims for numbers lost in the mails must be made immediately after receipt of the next following number for free replacement; back volume prices apply if payment is received after a volume is closed.



Notes on Begoniaceae -- I.

Lyman B. Smith and Dieter C. Wasshausen

United States National Museum, Washington, D. C., U.S.A.

In preparing an illustrated key to all the natural species of Begoniaceae we have found a number of cases requiring changes in nomenclature where good species have illegitimate names or in taxonomy where we are unable to distinguish a species and are reducing it to synonymy or where a nomen nudum has been cited and we need to describe it to use it in the key. The order is strictly alphabetical. We are indebted to Jack Golding and Carrie Karegeannes for a thorough and very helpful editing of our preliminary manuscript.

BEGONIA

abaculoides Ziesenhenné, Begonian 35: 257 (1968); -- Begonian 36: 39 (1969).

= boissieri A. de Candolle, Ann. Sci. Nat. Bot. IV. 11: 126 (1859).

amoena Wallich, Num. List. 129. no. 3682 (1831) nomen nudum;
Wallich ex A. de Candolle, Prodr. 15(1): 327 (1864);
H. Hara in H. Ohashi, Fl. E. Himalaya 3: 85, pl. 5d (1975).

= dioica F. Hamilton ex D. Don, Prodr. Fl. Nepal 223 (1825).

arnottiana A. de Candolle, Prodr. 15(1): 322 (1864); C. B. Clark in Hooker f. Fl. Brit. Ind. 2: 641 (1879) [= cordifolia Thwaites, Enum. Pl. Zeyl. 129 (1859)]; L. B. Smith & D. C. Wasshausen, nomen legitimum, non cordifolia Thwaites (1859).

arnottiana is not equal to cordifolia Thwaites. The inflorescence of arnottiana has a simple axis while that of cordifolia is dichotomous.

bakeri Elmer, Leafl. Philipp. Bot. 10: 3706 (1939) non C. de Candolle, Bull. Herb. Boissier II. 8: 320 (1908).

= luzonensis Warburg in Perkins, Fragm. Flor. Philipp. 52 (1904).

calophylla Irmscher, Mitt. Inst. Allg. Bot. Hamburg 6: 351 (1927) non Gilg ex Engler, Veg. Erde 9 (3,2): 617 (1921).

= algaia L. B. Smith & D. C. Wasshausen. nomen novum.

canaliculata Brade, Arq. Jard. Bot. Rio de Janeiro, 10: 132. pl. 1 (1950).

= sylvatica Meissner ex A. de Candolle, Ann. Sci. Nat. Bot. II. 11: 138 (1859).

The character of a sulcate stem by which Brade distinguishes canaliculata is also present in sylvatica although not described.

cariocana Brade, *Rodriguesia* 18: 26 (1945) nomen nudum; Brade ex L. B. Smith & D. C. Wasshausen. Sp. nov.

riedelii A. de Candolle var. latifolia Brade.
nomen in eadem schedula cum Begonia cariocana.

(Verisimiliter ob similitudinem cum B. riedelii A. de Candolle). Planta caulescens, glabra. Caulis erectus; internodia longa. Florum masculinorum tepala 4.

Foliorum stipulae ignotae; petioli ad 4 cm longi; laminae valde inequilaterales, subellipticae, usque ad 22 cm longae, ultra 13 cm latae, late acutae, basi transverse cordatae, sinu lato instructae, extus et lateraliter late lobatae, irregulariter dentatae. Inflorescentia laxa, multiflora, dichasia 4-5 gerens, pedunculo ultra 18 cm longo instructa; bracteeae ignotae. Fructus capsula, ca. 8 mm longa, alae valde inequales, ala maior late falcata, ultra 2 cm longa, ceterae subtriangulares. Pl. 1.

BRAZIL: RIO DE JANEIRO: Serra da Carioca, Rio de Janeiro (city), 17 December 1942, Edmundo Pereira 281, RB 47366 (holotypus GH, photo US; isotypus RB).

charadrophila Tutin, J. Bot. 78: 251 (1940).

= filipes Benth., Bot. Voy. Sulph. (5): 101 (1845).

crassicaulis (A. de Candolle) Warburg in Engler & Prantl, Nat. Pflanzenfam. 3(6a): 149 (1894) non Lindley, Edward's Bot. Reg. 28: Misc. 22. pl. 44 (1842).

= pachyrhachis L. B. Smith & D. C. Wasshausen. nomen novum.

crispula Yü ex Irmischer, Notes Roy. Bot. Gard. Edinburgh, 21: 38. (1951), non Brade, Arq. Jard. Bot. Rio de Janeiro, 10: 134, pl. 3, 4 (1950).

= cirrosa L. B. Smith & D. C. Wasshausen. nomen novum.

cristata Warburg ex Koorders, Natuurw. Tijdschr. Ned.-Indië, 63: 90 (1904). nomen nudum; Warburg ex L. B. Smith & D. C. Wasshausen, sp. nov.

Planta e fragmentis solum cognita, caulescens, verisimiliter erecta, glabra. Foliorum stipulae ignotae; petioli ad 5 cm longi; laminae valde inequilaterales, elliptico-oblongae, ca. 19 cm longae, 7.5 cm latae, late subacutae apiculataeque, sinu profundo instructae sed lobi basales imbricati, extus late rotundato-lobatae, irregulariter dentatae. Inflorescentiae haud ramosae; flores pauci, axillares, fasciculatae; pedicelli graciles, breves; bracteeae ignotae. Florum masculinorum tepala 4, elliptica, rotundata; stamina multa; antherae oblongae, connectivo producto obtuso instructae. Fructus capsula, subequaliter tripartita; alae subtriangulares, truncatae, obtusae. Pl. 2.

INDONESIA: CELEBES: "Leg. Sarason, N. Celebes, Tomoher (?), Apr. 94" (K, lectotype, photo US).

Evidently the original material in Berlin was lost, as the label on the Kew material says "ex Museum botanicum Berolinense" and we did not locate any material in Berlin. There may well be better material in Bogor but we must leave any emended description to whomever writes the Begoniaceae for Indonesia.

dielsiana Gilg, Bot. Jahrb. Syst. 34: 91 (1904) non E. Pritzel in Diels, Bot. Jahrb. Syst. 29: 479 (1900).

= cameroonensis L. B. Smith & D. C. Wasshausen. nomen novum.

Engler's West African species of Begonia have been very finely divided, as shown by de Wilde, but until he completes his studies we must take the species at face value.

elegans Elmer, Leaflets Philipp. Bot. 7: 255⁴ (1915), non

Humboldt, Bonpland & Kunth, Nov. Gen. Sp. 7: 182 (1825).

= sarmentosa L. B. Smith & D. C. Wasshausen. nomen novum.

erosa Wallich, Num. List 129, no. 3688 pro parte (1831) nomen nudum; A. de Candolle, Prodr. 15(1): 327 (1864)

[= amoena Wallich ex A. de Candolle (1864); C. B.

Clarke in Hooker f. Fl. Brit. Ind. 2: 642 (1879)

[= tenella D. Don, Prodr. Fl. Nepal 223 (1825)];

H. Hara in H. Ohashi, Fl. E. Himalaya 3: 85 (1975).

= dioica F. Hamilton ex D. Don, Prodr. Fl. Nepal 223 (1825).

fagopyroides Kunth & Bouche, Ind. Sem. Hort. Berol. 16. 1845.

= denticulata Humboldt, Bonpland & Kunth, Nov. Gen. Sp. 7: 182 (1825).

franconis Liebmann, Ved. Medd. Naturh. For. Kjøbenhavn 21 (1852)

= wallichiana sensu Lehmann in E. Otto, Neue Allg. Deutsche Garten-Blumenzeitung 6: 455 (1850) non Steudel, Nom. ed. 2. 1: 194 (1840); Doorenbos, Begonian 42: 213, fig. (1975).

This is a very confusing and unfortunate situation whereby an American species must assume a name closely associated with Indian botany. Steudel's publication wallichiana (Nomencl. ed. 2. 1: (1-2): 194. 1840 was evidently intended as a nomen novum for parviflora Hamilton ex Wallich, Num. List. 129, no. 3674. 1831, nomen, non Poeppig & Endlicher, 1835. However, since parviflora Hamilton ex Wallich was invalid there was no description and wallichiana Steudel was also invalid. Lehmann then tried to validate wallichiana of Steudel but based his description on a specimen in the Hamburg Hortus that was the same as franconis Liebmann. Thus the New World name franconis must be replaced by one in honor of a student of Indian botany.

gemella Warburg ex Koorders, Natuurw. Tijdschrift Ned.-Indië, 63: 91 (1904), nomen nudum; Warburg ex L. B. Smith & D. C. Wasshausen, sp. nov.

Planta imperfecte cognita, caulescens, glabra. Caulis repens, gracilis; internodia ca. 2 cm longa. Radices gracillimae, ex internodiis enascentes. Foliorum stipulae persistentes, lanceolatae, attenuatae, ca. 1 cm longae; petioli graciles ad 4 cm longi; laminae inequilaterales, suborbiculares, ad 8 cm longae, late acuteque sublobatae, basi oblique cordatae, alibi subintegrae. Inflorescentiae typi unisexuales, masculina ignota; feminea uniflora, axillaris; pedunculus 1 cm longus; bracteae persistentes, late ovatae, acutae, 2 mm longae; pedicellus 7 mm longus. Fructus, capsula, subequaliter triangulari; alae semi-orbiculares, truncatae, 1 cm longae. Pl. 3.

INDONESIA: CELEBES: "Minahassa, leg. Koorders, ex Museum botanicum Berolinense" (K, lectotypus, photo US).

hidalgensis L. B. Smith & Schubert, J. Wash. Acad. Sci. 40: 241, fig. 1, b-g (1950).

= pinetorum A. de Candolle, Ann. Sci. Nat. IV. 11: 131 (1859).

Material of this species ranges from the curved simple axis of typical pinetorum to the slightly irregular dichotomy of hidalgensis.

hispidissima Zippal ex Koorders, Meded. Lands Plantentuin, 19: 484 (1898), emend. L. B. Smith & D. C. Wasshausen.

Planta e fragmentis solum cognita, caulescens hispidissima. Caulis repens (?) vel erectus (?), ramosus; internodiis ad 7 cm longis. Foliorum stipulae persistentes, ovatae, acutae, ca. 1 cm longae; petioli ad 6 cm longi; laminae rectae vel obliquae, valde asymmetricae, oblongo-ellipticae, ad 11 cm longae, 5 cm latae, lateraliter paulo cordatae, late subacutae apiculataeque irregulariter dentatae. Inflorescentiae typi unisexuales, axillares, haud ramosae; pedunculi 15-17 mm longi; bractee persistentes, ovatae, acutae, 5-6 mm longae; inflorescentia masculina racemosa, pauciflora; florum tepala exteriora suborbicularia; inflorescentia feminea biflora; axis brevissimus. Fructus capsula, ellipsoidea, 1 cm longa; alae subaequales, triangulares, truncatae. Pl. 4.

INDONESIA: CELEBES: Minahassa, hb. Koorders 162418 (K ex B, lectotypus, photo US).

The original description is legal but so brief as to be completely useless. Unfortunately the Warburg detailed manuscript in Bogor is not available.

huberi C. de Candolle ex Hubert, Bull. Herb. Boissier, II. 1: 315 (1901).

= reniformis Dryander, Trans. Linn. Soc. London, 1: 161, pl. 14, fig. 1, 2 (1791).

inanis Irmscher, Bot. Jahrb. Syst. 74: 616 (1949). B. rosacea sensu L. B. Smith in part, Phytologia 27: 212 (1973).

= quetamensis L. B. Smith & Schubert, Caldasia 4(16): 8, pl. 1 (1946).

inermis Irmscher, Bot. Jahrb. Syst. 76: 39 (1953).

= reniformis Dryander, Trans. Linn. Soc. London, 1: 161, pl. 14, fig. 1, 2 (1791).

Bot. Jahrb. Syst. in Hunt.

kaletukensis Tutin, J. Bot. 78: 250 (1940).

= fischeri Shrank Pl. Rar. Hort. Acad. Monac. 1: 659 (1820).

koordersii Warburg ex Koorders, Natuurw. Tijdschr. Ned.-Indië, 63: 91 (1904). nomen nudum; Warburg ex L. B. Smith & D. C. Wasshausen, sp. nov.

Planta e fragmentis solum cognita, caulescens, verisimiliter glabra. Caulis erectus; internodia ultra 8 cm longa. Foliorum stipulae ignotae; petioli ad 14 cm longi; laminae inequilaterales, late ovatae, ad 12 cm longae, duplicato-dentatae, basi oblique cordatae. Inflorescentiae typi unisexuales; masculina ignota; feminea biflora, axillaris; pedunculus brevissimus; bractee persistentes, ca. 15 mm longis. Fructus capsula, paulo inequaliter alata; alae semiobovatae, truncatae; pedicelli ca. 1 cm longi. Pl. 5.

INDONESIA: CELEBES: Minahassa, hb. Koorders 162468 (K ex

B, lectotypus, photo US).

macgregorii W. W. Smith, Rec. Bot. Surv. India 6(4): 99 (1914),
non Merrill, Philipp. J. Sci. Bot. 7: 310 (1912).

= burmensis L. B. Smith & D. C. Wasshausen, nomen novum.

nigrovenia Regel, Gartenfl. 16: 163, pl. 546 (1867).

= pinetorum A. de Candolle, Ann. Sci. Nat. IV. 11: 131
(1859).

opuliflora Putzeys, Fl. Serres Jard. Eur. I. 10: 71, pl. 995
(1855), emend L. B. Smith & D. C. Wasshausen.

Petiole ad 4 cm longi.

The plate is obviously made from a living specimen with the same three-dimensional effect as that in a photograph. Thus most of the petioles are foreshortened, but the basal petiole is viewed sideways. We believe that Putzeys wrote from a superficial examination of the plate when he said "brevissime petiolatis" and that he was not viewing the live plant.

papillosa Lindley, Edward's Bot. Reg. 27: Misc. 39 (1841), non
R. Graham in Hooker, Bot. Mag. 55: pl. 2846 (1828).

= bufoderma L. B. Smith & D. C. Wasshausen. nomen novum.

petropolitana Glaziov, Bull. Soc. Bot. France, 56, Mem. 3d: 324
(1909). nomen nudum.

= egregia N. E. Brown, Gard. Chron. 1: 346 (1887).

purpurea Swartz, Prodr. Veg. Ind. Occ. 86 (1788). nomen validum
sed illegitimum.

= jamaicensis A. de Candolle, Ann. Sci. Nat. Bot. IV. 11:
124 (1859).

The name purpurea Swartz though validly published is superfluous and thus illegitimate. It is typified by B. obliqua Linnaeus. The taxon described by Swartz must be replaced by the next equivalent legitimate name if such exists.

purpurea Elmer, Leaflet. Philipp. Bot. 10: 3707 (1939), non Swartz,
Prodr. Veg. Ind. Occ. 86 (1788).

= neopurpurea L. B. Smith & D. C. Wasshausen. nomen novum.

ragozinii Schwacke, Fl. Nov. Mineiras 2: 4, pl. 3 (1900).

= grisea A. de Candolle, Ann. Sci. Nat. Bot. IV. 11: 138
(1859).

reniformis Vellozo, Fl. Flum. 10: pl. 40 "1827" (1831), non
Dryander, Trans. Linn. Soc. London, 1: 161. pl. 14,
fig. 1, 2 (1791).

= fabulosa L. B. Smith & D. C. Wasshausen. nomen novum.

robinsonii Merrill, Philipp. J. Sci. Bot. 6: 375 (1912), non
Ridley, J. Fed. Malay States Mus. 4(1): 22 (1909).

= perryae L. B. Smith & D. C. Wasshausen. nomen novum,
for Lily M. Perry, co-author of many species of
Begonia with E. D. Merrill.

salvadorensis Irmscher, Beitr. Biol. Pflanzen. 39: 440, fig. 2
(1963).

= udisilvestris C. de Candolle, Smithsonian Misc. Collect.
69(12): 9 (1919).

scabrida sensu J. D. Hooker, Bot. Mag. 120: pl. 7347 (1894).

= scabridoidea L. B. Smith & D. C. Wasshausen, sp. nov.

This differs from B. scabrida in its straight deeply cordate

leaf blades.

scandens Vellozo, Fl. Flum. Icon. 10: pl. 41 "1827" (1831) non Swartz, Prodr. Veg. Ind. Occ. 86 (1788).

= cerasiphylla L. B. Smith & D. C. Wasshausen. nomen novum.

setosa Klotzsch, Abh. Königl. Akad. Wiss. Berlin 31. 1855.

= fischeri Schrank, Pl. Rar. Hort. Acad. Monac. 2. pl. 59 (May 1820); Irmscher, Bot. Jahrb. Syst. 76:7 (1953).

simulans Irmscher, Bot. Jahrb. Syst. 76: 65 (1953), non Merrill & Perry, J. Arnold Arbor. 24: 52, fig. 5 e-i (1943).

= larorum L. B. Smith & D. C. Wasshausen. nomen novum.

subvillosa Klotzsch var. leptotricha (C. de Candolle) L. B. Smith & D. C. Wasshausen, comb. nov. stat. nov.

B. leptotricha C. de Candolle, Bull. Soc. Bot. Geneve II. 6: 121, fig. 4 (1914).

A var. subvillosa foliorum laminis supra pilis mollibus praeditis, seminibus late rotundatis differt.

In its acuminate to rounded seeds subvillosa closely parallels the variation in cucullata.

tenella D. Don, Prodr. Fl. Nepal, 223 (1825): H. Hara in H. Ohashi, Fl. E. Himalaya 3: 85 (1975).

= dioica F. Hamilton ex D. Don, Prodr. Fl. Nepal, 223 (1825).

toledoana Handro, Loeftgrenia 39: 3. 1969, named in honor of Joaquim Franco de Toledo, is not to be confused with toledana L. B. Smith & Schubert, Caldasia 4(16): 26, pl. 5 (1946) named for a settlement in Colombia. The slight difference in orthography is enough to make the later name legal.

tuberosa Lamarck, Encycl. 1 (2): 393 (1785). nomen validum sed illegitimum.

= muricata Blume, Cat. Hort. Buitenzorg 103 (1823).

The name tuberosa Lamarck although validly published is superfluous and thus illegitimate. It is typified by capensis Linnaeus filius.

vitifolia Schott in Sprengel, Syst. 4: app. 407 (1827).

= reniformis Dryander, Trans. Linn. Soc. 1: 161. pl. 14, fig. 1, 2 (1791).

Plate 1



AM. M. BOTANICO DO RIO DE JANEIRO

HERBARIO

1-10 N°

— Brade, m. g.

— L. B. Smith

— D. C. Wasshausen

2. 11. 1941

— D. C. Wasshausen

Plate 2



Ex Museum botanicum Berolinense
Begonia cristata Warb.
 fide D. C. Wasshausen

Plate 3



Plate 4



Begonia hispidissima Zippal ex Koorders

Plate 5



ADDITIONAL NOTES ON THE GENUS CARYOPTERIS (VERBENACEAE). I

Harold N. Moldenke

CARYOPTERIS Bunge

Additional & emended bibliography: Iwasuki, Honzo-zufu, ed. 1, 20: fol. 14 recto. 1838; Itôma, Somoku-Dzusetsu, ed. 1, 11: pl. 40. 1861; Hance, Journ. Linn. Soc. Lond. Bot. 8: 144. 1885; Henriq., Bol. Soc. Brot. 3: 144. 1885; Diels, Engl. Bot. Jahrb. 29: 550. 1900; Van., Bull. Acad. Geogr. Bot. 14: 171—172. 1904; C. K. Schneid., Illust. Handb. Laubholz. 2: pl. 382, fig. m—o. 1911; Dunn, Notes Roy. Bot. Gard. Edinb. 8: 154. 1913; Makino, Somoku-Dzusetsu, ed. 3, 4: pl. 38. 1913; Matsum., Bot. Mag. Tokyo 27: 274. 1913; W. W. Sm., Notes Roy. Bot. Gard. Edinb. 10: 18—19. 1917; Shirai & Okmuna, Honzo-zufu, ed. 2, 20: fol. 14, 1916—21; Breslau, Feddes Repert. Spec. Nov. Beih. 12: 475. 1922; Chung, Mem. Sci. Soc. China 1 (1): 228—229. 1924; Rehd., Journ. Arnold Arb. 15: 326. 1934; Mold., Phytologia 52: 415—437. 1983.

CARYOPTERIS CHOSENENSIS Mold.

Additional & emended bibliography: Iwasuki, Honzo-zufu, ed. 1, 20: fol. 14 recto. 1838; Itôma, Somoku-Dzusetsu, ed. 1, 11: pl. 40. 1861; Makino, Somoku-Dzusetsu, ed. 3, 4: pl. 38. 1913; Shirai & Okmuna, Honzo-zufu, ed. 2, 20: fol. 14 recto. 1916—21; W. W. Sm., Notes Roy. Bot. Gard. Edinb. 10: 18. 1917; Mold., Phytologia 52: 428, 430, 433, & 434. 1983.

Additional & emended illustrations: Iwasuki, Honzo-zufu, ed. 1, 20: fol. 14 recto. 1838; Itôma, Somoku-Dzusetsu, ed. 1, 11: pl. 40. 1861; Makino, Somoku-Dzusetsu, ed. 3, 4: pl. 38. 1913; Shirai & Okmuna, Honzo-zufu, ed. 2, 20: fol. 14 recto (in color). 1916—21.

Continued description: Corolla-lobes 4 small and obovate, 4—5 mm. long, the 5th larger, subcordate, reflexed, slightly longer than the tube; stamens 4, didymous, 3—3.5 cm. long, long-exserted, arcuately incurved; filaments 3—3.5 cm. long, basally slightly puberulous or pubescent; anther thecae horizontally divaricate; pollen grains triporate, oblate spheroidal or subprolate; style 3—3.5 cm. long or longer, long-exserted, usually equaling the stamens, apically bifid, the stigmatic branches rather long and acuminate; ovary obscurely 4-lobed, apiculate, externally glabrous or glandular-pubescent; fruiting-calyx 5—6 mm. long; fruit about 7.5 mm. wide, externally glandular-pubescent, on maturity splitting into 4 pyrenes; nutlets 4, obovoid, 4—4.5 mm. long, externally net-veined and glandular-punctate, very similar to those seen in the Lamiaceae.

This species is based on an unnumbered Siebold collection from somewhere in Japan, deposited in the Munich herbarium. The original description reads: "Cl. ramis tetragonis glabris, foliis inferioribus petiolatis e basi rotundata ovatis superioribus subsessilibus basi attenuatis lanceolatis, omnibus acutis grosse serrato-

dentatis glabris, cymis axillaribus divaricatis dichotomis paucifloris paniculatam laxissimam efficientibus, calycis cupularis laciniis brevissimis late deltoideis acutis, corollae tubo anguste cylindrico, staminibus longe exsertis, antherarum loculis divaricatis. Folia pollicaria vel sesquipollicaria, et inferiorum petioli 6—10" longi. Cymae axillares divaricatae bis trifidae 3—7-florae; pedicelli filiformes 3—4" longi. Corollae tubus semipollicaris. Antherae locula horizontaliter divergentia."

Recent collectors have found this plant growing in forests and at their edges, at 400—1300 m. altitude, in flower in August and September.

Vernacular names reported for the species are "gio", "hokakeso", "kaniganesō", "karigane-so", "kariganeso", "karigane sō", "spar-rige. Bartblume", and "yama dori sō".

Although almost uniformly listed and identified in herbaria as Caryopteris divaricata, this name is invalid because it is based on Clerodendron divaricatum Sieb. & Zucc. (1846), which, in turn, is invalid because it is a later homonym of the earlier validly published Clerodendrum divaricatum Jack (1820). The only other name proposed, Caryopteris coreana (Léveillé) Hara, cannot be used either because it is based on "Microtaena? coreana", a name not unequivocally accepted by its author, Léveillé, at the time of publication and therefore invalid. It is based on Faurie 752 from Mt. Nan-san, Seoul, Korea, collected on September 23, 1901, and deposited in the Edinburgh herbarium.

Briquet (1895) classifies this species in his Section Mastacanthus (Endl.) Briq. and regarded it as endemic to Japan, an assumption shared also by Jackson (1893) and Bean (1956). Ohwi (1965) reports it as inhabiting woods on mountainsides on the Japanese islands of Hokkaido, Honshu, Shikoku, and Kyushu, as well as in Korea and China.

A longitudinal section of an ovule is illustrated by Junell (1934) on the basis of a specimen cultivated at Uppsala, Sweden, and H. Smith 7763 from China. He indicates a placentation similar to that seen in the lamiaceous genus Amethystea. He asserts that "Von diesen beiden Typen [as seen in C. grata, C. paniculata, C. incana, and C. tangutica] weichen die Früchte von C. divaricata stark ab. Bei dieser Art haften die Teilfrüchte nur ganz wenig an der Basis aneinander und können leicht von einander getrennt werden. Die von dem becherförmigen Kelch umgebene Frucht ist somit stark lobiert und gleich augenscheinlich vollkommen einer typischen Labiatenfrucht. Der Unterschied von den vorhergehenden Typen ist ja nicht prinzipiell, sondern liegen die Verschiedenheiten hauptsächlich darin, wie gross die Fläche ist, mit der die einzelnen Teilfrüchte aneinander gränzen. Bei C. divaricata wird jeder Teilfrucht in grösserem Ausmass von der Aussenwandung des Gynäceums umgeben als bei den übrigen Arten, wo die Scheidewände zwischen den einzelnen Fächern des Fruchtknotens einen grösseren Teil der Fruchtwandung bilden. Dieser Wandung erhält auch verschiedene Ausbildung: bei C. divaricata ist sie mächtiger als bei C. incana und C. tangutica."

He concludes that "Bei einer eingehenden Bearbeitung dieser Gattung [*Caryopteris*] wird *C. divaricata* sicher nicht in dieselbe Gattung aufgekomen werden wie die Arten von *C. incana*-Typus." Erdtman (1945) agrees because of the "triporate, oblate spheroidal to subprolate [pollen] grains of about the same size and sculpturing as in the grains of *C. nepetaefolia* [which, however, has tricolpate grains], although the *ektexine* is comparatively much thicker. The triporate condition is a striking feature which," he avers, "lends support to Junell's conclusion." Dahlgren (1938) also classifies it in the *Lamiaceae*.

Bailey (1935) lists only *Floraire* in Geneva, Switzerland, as a source of seeds of this species for the horticultural trade.

Diels (1902) cites the Maximowicz reference in *Mélang. Biol.* as "1876", but actually the page here involved was not published until 1877. Some authors (e.g., Pritzel) date the Siebold & Zuccarini (1846) reference as "1843", others as "1844 or 1845" or even as "1847". Some cite it as "Fl. Jap. Fam. Nat. 523", but the "523" is a species number, not a page number. P'ei (1932) misdates the Miquel (1865) publication as "1856" and the Diels (1902) reference in the bibliography as "1900" and erroneously cites the Maximowicz (1876) reference as volume "22".

Crevost & Pételot (1934) report that in China a decoction of the leaves of *C. chosensis* is used in the treatment of beriberi — "elles ont, en outre, la réputation d'éclaircir des urines et de rendre la vue plus claire." Horses are said to be very fond of devouring the leaves.

Hosozawa and his associates (1973) have isolated 3 new insect antifeeding diterpenoids — caryoptin, dihydrocaryoptin, and caryoptin hemiacetal — from *C. chosensis*.

Diels (1913) cites Forrest 474, while Forbes & Hemsley (1890) cite Forbes s.n. from Kiangsi, Henry s.n. from Hupeh, and Gottsche s.n. from Korea. Franchet & Savatier (1875) assert that the species grows rather frequently "in scrobibus, secus vias" in central Japan about Yokoska, citing Buerger s.n., Savatier 923, and Siebold s.n. They also cite as illustrations: "Phonzo zoufou, vol. 20, fol. 14 recto, sub: Yama dori sô (Icon. rudis, dubia). — Sô mokou Zoussetz, vol. 11, fol. 40, sub: Karigane sô."

Handel-Mazzetti (1934) cites Smith 6597 & 7763 from Shansi. P'ei (1932) cites Henry 7319 & 24241 and Wilson 2424 from Hupeh. Maximowicz (1886) cites unnumbered collections of Buerger, Gottsche, Savatier, Siebold, and Tanaki and lists the Japanese vernacular name, "kari-gane-sô" from "soo bokf 11: 40".

Hyland (1968) cites U. S. Dept. Agr. Pl. Invent. 297564, cultivated in Maryland from seeds imported from Germany in 1964.

Material of *C. chosensis* has been misidentified and distributed in some herbaria as *C. mastacanthus* Schau., *Clerodendron* sp., and *Plectranthus japonicus* Koidz.

Citations: CHINA: Hupeh: E. H. Wilson 2424 (N, W—597005). Kwangtung: Shang 25 [Herb. Canton Chr. Coll. 14055] (A). Shansi: H. Smith 6597 (S), 7763 (S). KOREA: In-cho 9573 (Mi). KOREAN

COASTAL ISLANDS: Quelpart: In-cho 3817 (Mi). JAPAN: Hokkaido: W. P. Brooks 275 (Ca—365511), s.n. [22/8/1881] (Ca—368353, N—photo); Maximowicz s.n. [Hokodate, 1861] (Br, S, W—75973); Tokubuchi s.n. [Sept. 12, 1890] (N). Honshu: Collector undetermined 367 (W—74538), s.n. [Musashi, 19 Sept. 1910] (W—1133038), s.n. [Musashi] (W—206181); Herb. Mus. Bot. Stockh. s.n. (S); Herb. Sakata Nurs. s.n. [Dzushi, September 1913] (S); T. Koyama s.n. [28 August 1948] (Id); Makino 36904 (S), s.n. [Tokyo, Sept. 1894] (Bl—42207); J. Matsumura s.n. [Tokio, June 30, 1879] (W—147607); Y. Matsumura 1668 (N); Murata 19992 (N, W—2686147); Ohwi s.n. [Aug. 16, 1926] (Ba); Okuyama s.n. [Sept. 23, 1937] (Ba); Savatier 923 (Br, W—74539, W—484090), s.n. [Yokoska] (W—2497121); Suzuki 443 (Ca—928728), s.n. [Sep. 23, 1950] (Se—172832); Yasuda s.n. [Ojika, Rikuzen, Aug. 28, 1903] (Br). Jesso: Albrecht s.n. (C). Shikoku: Tagawa 5265 (Ws). Island undetermined: Herb. Lugd.—Bat. s.n. [Japonia, 1865] (M, S); Hogg s.n. (C); Rein 40 (Mu—1739); Siebold s.n. (Mu—780—type, Mu—781—istotype, Mu—782—istotype). CULTIVATED: Germany: Herb. Bot. Staatssamml. Münch. s.n. (Mu). Maryland: B. Y. Morrison s.n. [Exper. Farm, Bell, Sept. 6, 1928] (Ar—19839). Massachusetts: Blazic s.n. [Aug. 19, 1922] (Gg—32000). New York: Harkness s.n. [September 22, 1960] (Ba). MOUNTED ILLUSTRATIONS: Iitma, Somoku-Dzusetsu, ed. 1, 11: pl. 40. 1875 (Id); Makino, Illust. Fl. Nipp. 185, fig. 553. 1940 (Id, Id).

CARYOPTERIS xCLANDONENSIS Simmonds in Chittenden, Gard. Chron., ser. 3, 94: 226 & 231, fig. 108. 1933; Rehd., Man. Cult. Trees, ed. 2, 806. 1940; Turrill, Curtis Bot. Mag. 166: pl. 75. 1949.

Synonymy: *Caryopteris clandonensis* Hort. ex Mold., Annot. List 108. 1939. *Caryopteris incana* x *mongholica* Hort. ex Mold., Suppl. List Inv. Names 2, in syn. 1941. *Caryopteris mastacanthus* var. *clandonensis* Anon., Gard. Chron., ser. 3, 110 & 117, fig. 60. 1941. *Caryopteris Xclandonensis* "Simmonds ex Rehd." apud Turrill, Curtis Bot. Mag. 166: pl. 75. 1949. *Caryopteris Xclandonensis* Hort. ex E. J. Salisb., Ind. Kew. Suppl. 11: 45. 1953. *Caryopteris mastacanthus* var. *clandonensi* Barbey, Arbor. Ornament., ed. 4, 72. 1970. *Caryopteris incana* cv. "Heavenly Blue" Speta, Candollea 32: 155. 1977.

Bibliography: Chittenden, Gard. Chron., ser. 3, 94: 226 & 231, fig. 108. 1933; Chittenden, Journ. Roy. Hort. Soc. 59: 301 & Proc. cxxviii. 1934; Hillier, Journ. Roy. Hort. Soc. 61: 107. 1936; Chittenden, Journ. Roy. Hort. Soc. 61: Proc. cxxiii & clv. 1936; Chittenden, Ornament. Flow. Trees Shrubs 145. 1938; Mold., Annot. List 108. 1939; Rehd., Man. Cult. Trees, ed. 2, 806 & 933. 1940; Anon., Gard. Chron., ser. 3, 110: 110 & 117, fig. 60. 1941; Downey, Brooklyn Bot. Gard. Rec. 30: 23. 1941; A. D. Hall, Journ. Roy. Hort. Soc. 66: 455 & Proc. lxi. 1941; Heydenreich, Garten-

schönnh. 22: 92. 1941; Mold., Suppl. List Inv. Names 2. 1941; Worsdell, Ind. Lond. Suppl. 1: 190. 1941; A. P. Johnson, Journ. Roy. Hort. Soc. 67: 366, fig. 120. 1942; Kelsey & Dayton, Stand. Pl. Names, ed. 2, 92. 1942; Mold., Alph. List Inv. Names 12. 1942; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 71 & 87. 1942; Higgins, Some Good Gard. Pl. 14. 1946; "R. G.", N. Y. Times August 28: K.23. 1949; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 157 & 178. 1949; Rehd., Bibliog. Cult. Trees 586. 1949; Turcill, Curtis Bot. Mag. 166: pl. 75. 1949; Bean, Trees Shrubs Hardy Brit. Isls., ed. 7, 1: 365. 1950; Blackburn, Trees Shrubs East. N. Am. 108. 1952; E. J. Salisb., Ind. Kew. Suppl. 11: 45. 1953; Anon, N. Y. Herald Trib. February 21, 4: 15. 1954; Plaumann, Gartenwelt 18: 285, fig. 1. 1955; Bean in Chittenden, Roy. Hort. Soc. Dict. Gard. 1: 405. 1956; Boerner in Maatsch, Pareys Illust. Gartenbaulex. 1: 205. 1956; Chittenden, Roy. Hort. Soc. Dict. Suppl. 177. 1956; Wyman, Shrubs Vines Am. Gard. 121—122. 1956; Mattoon, Pl. Buyers Guide, ed. 6, 88. 1958; Mold., Am. Midl. Nat. 59: 335. 1958; Hay, Gard. Chron. 145: 411. 1959; Mold., Résumé 214, 249, & 445. 1959; Encke, Pareys Blumengärtn., ed. 2, 2: 448—449. 1960; Kelsey Nursery Service, Short Guide Cat. 167: 25. 1961; Kelway, Seaside Gard., imp. 1, 49, 138, 169, & 201. 1962; Pearce Seeds Plants, Our Am. Wild Fls. 15. 1962; Bush-Brown, Trees Shrubs Home Landsc. 79. 1963; W. J. Cody, Ind. Sem. Canada Dept. Agr. 1963: 12. 1963; Graf, Exotica 3: 1483 & 1568. 1963; Pearce, Seeds Plants 1963: 13. 1963; Pearce, New High-lights Fls. 8. 1963; Pinner, Downes, & Borthwick, Am. Journ. Bot. 50: 86—90, fig. 1 & 2. 1963; E. B. Anderson in Anderson, Balf., Fish, Wallis, & Finnis, Oxford Book Gard. Fls., imp. 1, 171 & 203, pl. 171, fig. 5 (1963) and imp. 2, 171 & 203, pl. 171, fig. 5. 1964; Kelway, Seaside Gard., imp. 2, 49, 138, 169, & 201. 1964; Lord, Shrubs Trees Austral. Gard., ed. 2, 254. 1964; R. A. Ludwig, Ind. Sem. Canada Dept. Agr. 1964: 7. 1964; Menninger, Seaside Pl. 91. 1964; Pearce Seeds Plants, Gard. Aristocrats 8. 1964; Hoag, Trees Shrubs North. Plains 203, 205, & 206. 1965; Kelway, Gard. Sand 42 & 135—136. 1965; N. Taylor, Guide Gard. Shrubs Trees 335. 1965; T. C. Everett, Readers Digest Compl. Book Gard. 420. 1966; Hellyer, Shrubs in Colour 24—25 & 27. 1966; DeWit, Pl. World High. Pl. 2: 185. 1967; Glasau, Sommergr. Ziergeh. 67. 1967; Hyland, U. S. Dept. Agr. Pl. Invent. 169: 41. 1967; Mold., Résumé Suppl. 15: 14. 1967; Wayside Gardens, [Cat.] 1967: 137. 1967; Wils. & Bell, Fragrant Year 187. 1967; E. B. Anderson in Anderson, Balf., Fish, Wallis, & Finnis, Oxford Book Gard. Fls., imp. 3, 171 & 203, pl. 171, fig. 5. 1968; Mold., Résumé Suppl. 17: 7. 1968; Sherk & Buckley, Ornament. Shrubs Canada 52. 1968; Watling, N. Zeal. Plants Gard. 7: 252. 1968; Anon., Biol. Abstr. 50 (22): S.30. 1969; L. T. Evans, Introd. Flowering 460. 1969; Fogg, Concise Guide Shrubs 30 & 31. 1969; Hay & Syngé, Color Dict. Fls. Plants Home 187 & 188, pl. 1496 & 1497. 1969; Syngé, Suppl. Dict. Gard., ed. 2, 227 & 239. 1969; Barbey, Arbor, Orement., ed. 4, 72. 1970; Bean, Trees Shrubs Hardy Brit. Isls., ed. 8, 1: 517—518, pl. 30. 1970; McGourty, 1200 Trees [Plants Gard. 26 (2):]

65. 1970; Schmelzer, *Phytopath. Zeit.* 67: [285], 292, 293, & 321—326. 1970; Aschersleben, *Hort. Abstr.* 41: 206. 1971; Mold., *Fifth Summ.* 1: 356 & 422 (1971) and 2: 856. 1971; E. B. Anderson in Anderson, Balf., Fish, Wallis, & Finnis, *Oxford Book Gard. Fls.*, imp. 4, 171 & 203, pl. 171. 1972; R. Bailey, *Good Housekeep. Illust. Encycl. Gard.* 4: 502. 1972; Crockett, *Flow. Shrubs* 100. 1972; Encke & Buchheim in Zander, *Handwörterb. Pflanz.*, ed. 10, 158. 1972; F. Perry, *Flowers World* 304 & 313. 1972; Skinner, *Ornament. Pl. Coast. Northw.* 75. 1972; Wyman, *Arnoldia* 32: 36. 1972; Wyman, *Gard. Encycl.*, imp. 2, 140 & 191. 1972; Schuler, *Gardn. Basic Book Trees Shrubs* 234 & 312. 1973; Seabrook, *Shrubs Gard.*, imp. 1, 39 & [145]. 1973; Gibbs, *Chemotax. Flow. Pl.* 3: 1753—1754. 1974; Harkness, *Seedlist Handb.* 44. 1974; Howes, *Dict. Useful Pl.* 48. 1974; F. Perry, *Compl. Guide Plants Flowers* pl. 418. 1974; Kelway, *Gardn. Sandy Soil* 42 & 135—136. 1975; Kooiman, *Act. Bot. Neerl.* 24: 464. 1975; Seabrook, *Shrubs Your Gard.*, imp. 2, 39 & [145]. 1975; Gault, *Color Dict. Shrubs* pl. 53. 1976; Layzell & Horton, *Canad. Journ. Bot.* 56: 1844—1851, fig. 1—14. 1978; Lord, *Trees Shrubs Austral. Gard.*, ed. 5, 254. 1978; Wright, Perry, Boyd, & Elsley, *Compl. Book Gard.* 172, 372, & 386. 1978; Layzell & Horton, *Biol. Abstr.* 67: 1151. 1979; C. W. Park, *Park's Springtime* 1979: 4 (1979) and 1980: 4. 1980; Mold., *Phytol. Mem.* 2: 346, 379, & 529. 1980; Munz & Slauson, *Ind. Illust. Living Things Outside N. Am.* 260 & 328. 1981; Mold., *Phytologia* 52: 434. 1983.

Illustrations: Chittenden, *Gard. Chron.*, ser. 3, 94: 231, fig. 108. 1933; Anon., *Gard. Chron.*, ser. 3, 110: 117, fig. 60. 1941; Heydenreich, *Gartenschönh.* 22: 92. 1941; Turrill, *Curtis Bot. Mag.* 166: pl. 75 (in color). 1949; Anon., *N. Y. Herald Trib.* February 21, 4: 15. 1954; Plaumann, *Gartenwelt* 18: 285, fig. 1. 1955; Bean in Chittenden, *Roy. Hort. Soc. Dict. Gard.* 1: 405. 1956; Hay, *Gard. Chron.* 145: 411. 1959; Encke, *Pareys Blumengärtn.*, ed. 2, 2: 449. 1960; Graf, *Exotica* 3: 1483. 1963; Piringer, Downes, & Borthwick, *Am. Journ. Bot.* 50: 87 & 88, fig. 1 & 2. 1963; E. B. Anderson in Anderson, Balf., Fish, Wallis, & Finnis, *Oxford Book Gard. Fls.*, imp. 1, pl. 171, fig. 5 (in color) (1963) and imp. 2, pl. 171, fig. 5 (in color). 1964; Pearce *Seeds Plants, Gard. Aristocrats* 8. 1964; Hoag, *Trees Shrubs North. Plains* 203 & 205. 1965; Hellyer, *Shrubs Colour* 24 & 27 (in color). 1966; *Wayside Gardens*, [Cat.] 1967: 137 (in color). 1967; E. B. Anderson in Anderson, Balf., Fish, Wallis, & Finnis, *Oxford Book Gard. Fls.*, imp. 3, pl. 171, fig. 5 (in color). 1968; Hay & Syngé, *Color Dict. Fls. Plants Home* 187 & 188, pl. 1496 & 1497 (in color). 1969; Bean, *Trees Shrubs Hardy Brit. Isls.*, ed. 8, 1: pl. 30. 1970; E. B. Anderson in Anderson, Balf., Fish, Wallis, & Finnis, *Oxford Book Gard. Fls.*, imp. 4, pl. 171, fig. 5 (in color). 1972; R. Bailey, *Good Housekeep. Illust. Encycl. Gard.* 4: 502 (in color). 1972; Crockett, *Flow. Shrubs* 100 (in color). 1972; Seabrook, *Shrubs Gard.* 39 (in color). 1973; F. Perry, *Compl. Guide Plants Flowers* pl. 418. 1974; Gault, *Color Dict. Shrubs* pl. 53 (in color). 1976; Layzell & Horton, *Canad. Journ. Bot.* 56: 1847—1850, fig. 1—14. 1978; C. W. Park, *Park's Springtime* 1979: 4

(in color) (1979) and 1980: 4 (in color). 1980.

A shrub, about 0.5—1.5 m. tall; stems slender, terete, more or less branched, the older parts brownish, the younger parts gray, with a short whitish indument which is dense on the upper parts and less so on the lower parts; principal internodes 3—5 cm. long; leaves decussate-opposite; petioles 1—2 cm. long, densely puberulent; leaf-blades lanceolate to elliptic-lanceolate, 2.5—5 cm. long, apically acute, sharply short-apiculate, marginally rarely entire, usually with 1—6 coarse, apically acute and short-apiculate teeth per side (which are 1—7 mm. long), basally cuneate to subrotund, dark-green and rather densely puberulent above, grayish-white and very densely matted-tomentellous beneath, the hairs on both surfaces short; secondaries 6 or 7 per side, inconspicuous above, rather prominent (along with the midrib) beneath; inflorescence terminal and also axillary in the upper leaf-axils; peduncles 1—2 cm. long; cymes to about 25-flowered, not bracteate, densely puberulent; pedicels 1—4 mm. long; calyx narrow-campanulate, persistent, about 4 mm. long and 2 mm. wide, externally densely white-puberulous, internally very shortly glandular-pilose, 5-lobed, the lobes linear-lanceolate, 2 mm. long, basally 0.75 mm. wide, apically acute, with a strong midrib and lateral veins issuing almost at right angles; corolla about 8 mm. long (excluding the lower lip), blue-violet to light blue-violet on the Ridgway Color Standards chart, the tube cylindric, 6 mm. long, 1.5 mm. wide, externally apically puberulent, basally glabrous, internally with longer matted hairs 1—2 mm. below the apex, the upper and lateral lobes rounded-ovate, 2—2.5 mm. long, 2 mm. wide, apically short-apiculate, the lower (abaxial) lobe cochlear, 6 mm. long, the claw 3.5 mm. long and 1.25 mm. wide, the lamina subrotund, about 4 mm. long and wide, apically strongly fimbriate, not emarginate nor bilobed, the fringes to 2 mm. long; stamens long-exserted; filaments slender, inserted near the top of the corolla-tube, 9 mm. long, glabrous; anthers ovate-elliptic, 0.75 mm. long; style very slender, long-exserted, subequaling the stamens, about 12 mm. long, apically unequally bilobed, the branches 1.5 and 1.25 mm. long; stigmas very small, capitate; ovary broadly obovate, about 1 mm. long and wide, dark-brown, slightly biconvex, externally glabrous; capsule obovate, about 5 mm. long and 3 mm. wide, narrowly alate, apically rounded, eventually splitting into 4, 1-seeded, deciduous, valvate nutlets which are circumferentially narrowly alate on the long axis, completely enclosing a single, pendulous seed attached adaxially near the apex, a central column absent; seeds pyriform, about 3.5 mm. long and 1.5 mm. wide, abaxially rounded, adaxially with 2 rather unequal flat faces.

This plant is said to have originated as a chance natural hybrid between plants of *C. incana* (Thunb.) Miq. and *C. mongholica* Bunge growing in the garden of Arthur Simmonds, then the Assistant Secretary of the Royal Horticultural Society (of London), at West Clandon in Surrey, England, in or about 1930 — the Moldenke collection, cited below, being taken from the type plant. The date of origin of the hybrid is given variously as "1933" and "1936" by some writers (e.g., Wyman, 1956, 1972). The same binomial has la-

ter been applied to a group of hybrids derived by artificial breeding from the same two parental species or between either one of them and C. Xclandonensis, or by selective breeding, some of which have also been given definite cultivar or trade names (see below).

The original plant received an Award of Merit from the Royal Horticultural Society at Vincent Square, London, on the basis of a specimen exhibited by A. Simmonds, Esq., of West Clandon, on September 12, 1933, and is described by Chittenden (1934) as "A most ornamental late-flowering shrub....The sprays were about eighteen inches long with numerous, soft, grey-green, lanceolate leaves, some of which were entire and some coarsely toothed. The deep lavender-blue fringed flowers are produced in dense flattened, axillary cymes". In his 1933 note the same writer says that "The flowers are of a richer blue than whose of the well-known C. Mastacanthus, and the leaves are of a pleasing greyish tone above and silvery below."

Turrill (1949) remarks that it "has many characters approximately intermediate between those of the parents. The leaves are longer, relative to their breadth, than are those of C. incana and broader than in C. mongholica. The marginal toothing is like that of C. incana but is much less regular, the number of teeth varying not only from leaf to leaf but even on the two sides of a single leaf. Occasional leaves are entire. Leaf developments suggests hybrid vigour, especially in leaf length. The inflorescences have peduncles at least as long as or even longer than those of C. mongholica, but show the influence of C. incana in the denser arrangement of the flowers and hybrid vigour in the flowers being often more numerous than in either parent. Flower size is about intermediate."

The original clone, now known as cv. Arthur Simmonds, is an ornamental, late summer- and autumn-flowering, rounded, small to low or medium-low, straggly, woody bush, shrublet, or shrub, usually 18--36 inches tall, but occasionally to 5 feet tall under good growth conditions, of excellent form, producing 30 or more inflorescences on mostly low arching branches. The leaves are in general aspect grayish-green, at least as to their lower surface. The petioles are grayish-white. The leaf-blades are aromatic when crushed, ovate-lanceolate to lanceolate, apically pointed, basally rounded or broadly cuneate, marginally entire or with only a few triangular teeth, dull-green and somewhat wrinkled above, grayish or grayish-white beneath and densely covered with a closely appressed silvery down. The inflorescence is borne only on the new season's growth, the individual cymes being many- (usually to about 20-) flowered, both axillary and terminal, 2.5--3.2 cm. wide, branched. The flowers are fragrant. The corolla is usually a lovely bright-blue (blue dauphin near 203.f.1 in the "Rep. Couleur"), especially the lobes, brighter blue than those of C. incana, 5-lobed, 4 lobes being much smaller, the 5th (forming the abaxial or inferior lip) much larger and conspicuously fringed at the apex.

The corollas have also been described by authors and collectors as "deep-blue", "powder-blue" [R. Bailey, Watling], and "powdery-blue". It is described as having been "blue" on Sykes s.n. [2.4. 1964] and "deep-blue" on Sykes 100/68. Kelsey (1961) refers to it as "clear-blue"; McGourty (1970) calls it "light-blue" and Kelsey (1965) describes it as "violet-blue". Lord (1964) emphasizes that it is "brighter blue than in C. incana". It is described as "blue" on Dress 5336 & 5652, "deep blue-purple" on Hill 10753 (a collection with remarkably small leaves), as "azure-blue" on Meyer 5805 (said to represent the cv. Kew Blue), "RHS Flax Blue 640-640/1, the lower lip white-fringed" on Bates 211 (said to represent cv. Blue Mist), "RHS Veronica Violet 639 and lighter" on Poole 924, and "rich blue" by Chittenden (1933), while Zinck, on his 30-25-52 collection, notes "corolla deep-blue, plant 1 foot tall, some flowers with 2 stamens, one longer than the other". Palmer's collection bears a notation that it was taken from a plant obtained from Kew in 1936. Collectors have found the plant in flower from August to October.

Bean (1970) asserts that "On the whole this can probably be rated as the most attractive in the genus and it is evidently quite hardy near London, flowering abundantly in September. It makes a shapely, rounded, soft-wooded bush growing 2 feet high....It sets seed freely but the seedlings are not necessarily as hardy or such good garden plants as the parent." It should be pruned back severely in spring [McGourty says "to the ground"] to the older wood, removing only the previous season's growth. It will usually bloom the first year from seed. It is also sold under the names "bluebeard", "blue-spirea", "Clandon bluebeard", and "hardy blue-spirea".

It may be distinguished from its less hardy parental species, according to Blackburn (1952), as follows:

1. Leaves less than 1 cm. wide, tapering at both ends.....C. mongholica.
- 1a. Leaves more than 1 cm. wide, not tapering.
2. Leaves irregularly toothed, lanceolate.....C. Xclandonensis.
- 2a. Leaves coarsely but evenly toothed, ovate to oblong-ovate..C. incana.

Horticulturally this plant is quite satisfactory in climates like that of London and New York, where it is perfectly winter-hardy and usually does not die down to the ground level. It is certainly hardier there than either of its two parental species. Summer- and autumn-flowering shrubs are scarce and so are dwarf-growing ones no matter at what season of the year they bloom. The Clandon bluebeard usually grows to a height of only 1 1/2 or 2 feet, but under perfect conditions may attain to 5 feet. The correct way to cultivate it is to cut back the branches in the early spring to leave a well-spaced crown about a foot or 18 inches high, depending on how far back it has winter-killed, and about equally wide. Such a plant will probably add 1 1/2 to 2 feet in new growth that season. Normally it will blossom already during the first season. Since the flowers are produced only on the new growth, drastic pruning the

following season not only does not interfere with the floral display, but actually enhances it. In August and September, in most localities, the plants will exhibit a mass of bright blue flowers and will provide a delightful show when probably few other plants will be in bloom. Each late autumn a manure mulch should be introduced around the individual plants and the next spring this material should be cultivated into the soil.

This hybrid is best suited for planting, spaced 2--3 feet apart, in a perennial border or in front of larger-growing species of shrubs. It should always have a well-drained soil in a sunny situation. Transplanting does not require any more care than is normally demanded by other shrubs. Branches that touch the ground will easily take root there within one growing season and so will provide an opportunity easily to secure more plants with exactly the same characters. Planting in the spring after the danger of a late frost is past is best. Propagation by seed, while also very easy, is less to be recommended since it may result in plants with characters differing from the ones desired. The plant seems to enjoy considerable immunity from attack by ordinary garden insect pests, although Schmelzer (1970) reports that it is attacked by the cucumber mosaic virus. Gibbs (1970) has found syringin absent from its leaves.

Bush-Brown (1963) claims that the best of the hybrids are Blue Mist "which has powdery blue flowers from August until frost" and Heavenly Blue "with deep blue flowers in autumn". Watling (1968) asserts that the plant produces "spikes [really they are cymes] of powder blue in summer [in New Zealand].....seed heads [fruiting cymes] are delicate in dried arrangements."

The hybrid binomial is often written without the "X" hybrid designation as though the plant were a true natural species [e.g., by Schmelzer, 1970, 1971, Wyman, 1956, 1972, 1976, Gibbs, 1974, Pearce, 1963]. Pearce, in 1962--1964, offered seeds at 25 cents a packet; in 1980 plants were selling at \$6.50 each or 3 for \$18. Mattoon (1958) lists 15 sources from which seeds or plants could be purchased in the horticultural trade.

Seabrook again asserts that the plants of C. Xcandonensis, no matter which clone or cultivar, should be pruned back hard in the period from February to April by cutting off the winter-killed last-season's wood to about 5 cm. from the older wood. He asserts that "A mixed shrub border is the perfect setting for this plant. Groups should be sited to the front of such borders, where the low-growing habit can be fully seen." Cuttings will root easily in sandy soil in summer or early autumn. Hoag (1960) also agrees that it is "subject to freezedback, but [is still] acceptable for cultivation in southern areas of the northern plains in western Dakota [U.S.A.]." He continues that "this hybrid is represented by several clones, perhaps all of which may be considered acceptable and probably distinctly preferable to the parental species... [which are now] rarely encountered [in gardens]."

Collectors have found C. Xcandonensis in bloom in April and May in the Southern Hemisphere and in August and September in the

Northern Hemisphere and there in fruit in October.

Besides the original cv. Arthur Simmonds, which Encke (1960) truly notes is "von C. incana nur wenig unterschieden", there occur also in the horticultural trade today at least 4 other clones:

- (1) cv. Ferndown — with the leaves dark-green and the corollas of a deeper blue or darker violet-blue than in cv. Arthur Simmonds. Originated by Messers. Stewart of the Ferndown Nurseries, Dorset, England, before 1967.
- (2) cv. Heavenly Blue — with more erect and compact habit than either cv. Arthur Simmonds or cv. Ferndown. It was exclusively introduced by Wayside Gardens in 1953 as Plant Patent 1091 and described as "A new dark blue form of the very popular Caryopteris Blue Mist introduced by Wayside Gardens several years ago. This brand new origination, the result of many crosses and selections, is a delightful shrub. Upright in growth, mature plants are 15" wide and 24" tall. Each plant will produce 20 or more exquisite, deep blue, flower-spikes, a rare color in the fall garden". Of course, as noted previously, the flowers are not borne in spikes, but in cymes. Probably "20 or more sprays" was the phrase intended. Glasau (1967) avers that this is the "best variety". The cymes are described by some authors as both axillary and terminal, branched, 2.5—3.2 cm. wide, the flowers fragrant. Actually, the uppermost cymes are only subterminal.
- (3) cv. Blue Mist -- originated at Wayside Gardens about 1942, described as having "powder blue" or "powdery blue flower clusters.
- (4) cv. Kew Blue — a smaller shrublet with the corollas darker blue (than in cv. Arthur Simmonds) to deeper violet or dark blue-violet. Turrill (1949) says of this cultivar: "At Kew, from seeds of the original hybrid, a variant has been raised which has even greater horticultural virtues, for the flowers are of a richer and deeper violet-blue colour than are those of its immediate F_1 parent. This latter is very attractive to bees and produces good crops of seeds which germinate freely to produce a varied progeny."

The best forms of all these cultivars are uniformly superior, horticulturally, than either of the two original parental species.

Cody (1963) offered seed of cv. Blue Mist and cv. Heavenly Blue to botanical gardens and the horticultural trade from Canadian-grown plants. Kelsey (1961) offered cv. Blue Mist to the trade at the rate of \$1.45 each for 18-inch 2-year-old plants, 10 for \$12, insisting that the roots would be hardy in growth zones 2 and 3 and even the tops would be hardy in zone 6, the plants flowering there from August to frost. Mattoon (1958) lists 6 horticultural sources for cv. Heavenly Blue and no less than 48 (plus "most nurseries") for cv. Blue Mist.

Evans (1969) reports that C. Xclandonensis is "indifferent to day length for flower evocation but has absolute photoperiodic requirements for flower differentiation."

Piringer and his associates (1963) report that flower-buds were

initiated on plants of this hybrid "on all photoperiods, but developed to anthesis only when daily dark periods exceeded 8 hours. Anthesis occurred in not less than 22 days after the beginning of 11 or more short photoperiods. Treatments with short days could be interrupted by as many as 30 non-inductive long days without significant increase in the minimum number of short days required for anthesis. Anthesis, like floral initiation in many plants, was reversibly controlled by red and far-red radiation acting through photochrome. The inductive effectiveness of long dark periods was nullified by 1 min or red light or about 1 hr of far-red. It was modified by night temperature in the range of 45-70 F and filament lengths of stamens were shorter at night temperatures of 60 than at 70 F."

Layzell & Horton (1978) describe floral development in this plant from cyme initiation to full anthesis, with emphasis on the development of the anthers. The later stages of floral development and anthesis are completed only on mature plants under short-day (8 hours of light) regimen. Under long-day (20 hours of light per day) regimen senescence occurs already in the early stages of anther-wall differentiation. Gibbs (1974) reports leucoanthocyanins and cyanogenesis absent from the leaves, while a positive (dark blue-green) result was obtained from application of the Ehrlich test.

Kelway (1962) reports that capsid bugs may become troublesome on these plants and, if so, may be controlled by dusting with a DDT preparation.

Hyland (1967) cites U. S. Dept. Agr. Pl. Invent. nos. 271686-271689, all from imported English seed, while Wyman (1972) cites Arnold Arb. Pl. Introd. no. 562-36.

Citations: CULTIVATED: California: Dress 5336 (Ba). Canada: Zinck 39-25-52 (Ba). District of Columbia: S. R. Hill 10753 (Ba--390151). England: F. G. Meyer 5805 [U. S. Dept. Agr. Pl. Introd. 242872] (Ba); Moldenke & Moldenke 2968 (N); Musgrove s.n. [September 1936] (N); Whitefoord s.n. [August 1960] (Mi). Massachusetts: E. J. Palmer s.n. [Herb. Arnold Arb. 562-36] (Ba, Ur); Wilberding 562-36 [Aug. 18, 1936] (Ba), 562-36 [Oct. 22, 1936] (Ba). New Zealand: Sykes 100/68 [Herb. Bot. Div. D.S.I.R. 181468] (Ac), s.n. [2.4.1964; Herb. Bot. Div. D.S.I.R. 149641] (Ld). Pennsylvania: Bates 211 (Ba); Peele 924 [acc. 57457] (Ba). Washington: Dress 5652 (Ba). MOUNTED ILLUSTRATIONS: Chittenden, Gard. Chron., ser. 3, 94: 231, fig. 108. 1933 (Ba, Ld, Ld); Hay, Gard. Chron. 145: 411. 1959 (Ba--381475).

CARYOPTERIS FOETIDA (D. Don) Thellung, Vierteljahrsschr. Nat. Ges. Zürich 64: 782. 1919.

Synonymy: Clerodendron foetidum D. Don, Prodr. Fl. Nepal. 103. 1825 [not C. foetidum Bunge, 1833, nor Hort., 1853]. Volkameria foetida Hamilt. ex D. Don, Prodr. Fl. Nepal. 103, in syn. 1825. Vitex? sex-dentata Wall., Numer. List [48], no. 1759, 1829. Clerodendron gratum Wall., Numer. List 50 ["49"], no.

1813, hyponym. 1829 [not C. gratum Kurz, 1885]. Clerodendrum granum Jameson, Rep. Bot. Gov. Northw. Prov. 164. 1855; J. F. Wats., Ind. Nat. Scient. Names 523. 1868. Caryopteris grata Benth. in Benth. & Hook. f., Gen. Pl. 2 (2): 1158. 1876. Volkameria foetida Buch.-Ham. apud Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 149, in syn. 1895. Vitis sexdentata Wall. ex Fedde & Schust., Justs Bot. Jahresber. 47 (2): 245, sphalm., in syn. 1927. Caryopteris foetida Thellung apud A. W. Hill, Ind. Kew. Suppl. 7: 41. 1929. Caryopteris grata Benth. & Hook. f. ex Mold., Alph. List Inv. Names 55, in syn. 1940. Clerodendrum foetidum D. Don ex Mold., Alph. List Inv. Names 23, in syn. 1940. Clerodendron granum Jameson ex Mold., Alph. List Inv. Names Suppl. 1: 6, in syn. 1947. Clerodendron gratum Benth. ex Mold., Alph. List Inv. Names Suppl. 1: 6, in syn. 1947. Vitex sexdentata Wall. ex Mold., Alph. List Inv. Names Suppl. 1: 29, in syn. 1947. Caryopteris rangutica (Bean) ex Anon., U. S. Dept. Agr. Bot. Subj. Ind. 15: 14354, sphalm. 1958. Caryopteris grata (Wall.) Benth. apud Suwal, Fl. Phulch. Godaw. 89. 1969. Vitex 6-dentata Wall. ex Mold., Phytologia 52: 129, in syn. 1982. Caryopteris foetida (D. Don) Thib., in herb.

Bibliography: D. Don, Prodr. Fl. Nepal. 103. 1825; Sweet, Hort. Brit., ed. 1, 1: 322. 1826; Wall., Numer. List [48] & 50 ["49"], nos. 1759 & 1813. 1829; Sweet, Hort. Brit., ed. 2, 416. 1830; G. Don in Sweet, Hort. Brit., ed. 3, 550. 1839; Schau. in A. DC., Prodr. 11: 674 & 696. 1847; Planch., Fl. Serres, ser. 1, 9: 17. 1853; Van Houtte, Fl. Serres, ser. 1, 9: 18. 1853; Jameson, Rep. Bot. Gov. Northw. Prov. 164. 1855; Buek, Gen. Spec. Syn. Candoll. 3: 106 & 502. 1858; J. F. Wats., Ind. Nat. Scient. Names 523. 1868; Benth. in Benth. & Hook. f., Gen. Pl. 2 (2): 1158. 1876; C. B. Clarke in Hook. f., Fl. Brit. India 4: 596—598. 1885; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 178. 1895; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 2: 1214 & 1219. 1895; Gamble, Man. Indian Timb., ed. 2, imp. 1, 544. 1902; Brandis, Indian Trees, imp. 1 & 2, 512 (1906), imp. 2a, 512 (1907), and imp. 3, 512. 1911; Parker, For. Fl. Punjab, ed. 1, 404. 1918; Thellung, Vierteljahrsschr. Nat. Ges. Zürich 64: 782. 1919; Brandis, Indian Trees, imp. 4, 512. 1921; Gamble, Man. Indian Timb., ed. 2, imp. 2, 544. 1922; Parker, For. Fl. Punjab, ed. 2, 404. 1924; Fedde & Schust., Justs Bot. Jahresber. 47 (2): 245. 1927; Osmaston, For. Fl. Kumaon 413 & 414. 1927; Fedde, Justs Bot. Jahresber. 47 (2): 292. 1929; A. W. Hill, Ind. Kew. Suppl. 7: 41. 1929; Junell, Symb. Bot. Upsal. 1 (4): 118. 1934; Mold., Prelim. Alph. List Inv. Names 23 & 55. 1940; Mold., Alph. List Inv. Names 12. 1942; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 54, 71, & 87. 1942; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 2, 2: 1214 & 1219. 1946; Mold., Alph. List Inv. Names Suppl. 1: 6 & 29. 1947; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 125, 157, & 178. 1949; Parker, For. Fl. Punjab, ed. 3, 576. 1956; Iljin, Acad. Sci. Bot. Inst. Dept. Repr. Mat. Hist. Fl. Veg. USSR. 3: 216. 1958; Mold., Résumé 159, 160, 214, 249, 263, 264, 272, 389, & 445. 1959;

Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 2: 1214 & 1219. 1960; Rau, Bull. Bot. Surv. India 3: 238. 1961; Gupta, Season. Fls. Indian Summ. Resorts Moos. 67 & 81. 1967; Pande, Bull. Dept. Med. Pl. Nepal 1: 36. 1967; A. Löve, Taxon 17: 203. 1968; Mold., Résumé Suppl. 16: 9. 1968; Kapoor, Singh, Kapoor, & Srivastava, Lloydia 32: 303. 1969; Suwal, Fl. Phulch. Godaw. 89. 1969; Farnsworth, Pharmacog. Titles 5 (11): iv & item 14440. 1970; R. J. Moore, Reg. Veg. 68: 71. 1970; Brandis, Indian Trees, imp. 5, 512. 1971; Farnsworth, Pharmacog. Titles 5, Cum. Gen. Ind. 1971; Mold., Fifth Summ. 1: 267, 269, 271, 272, 356, 442, 446, 461, & 462 (1971) and 2: 727 & 856. 1971; Mold., Phytologia 20: 487. 1971; Gill, Biol. Abstr. 54: 3419--3420. 1972; Gill, Bull. Torrey Bot. Club 99: 36--38. 1972; Rouleau, Taxon Index 1: 72. 1972; R. R. Stewart, Annot. Cat. in Nasir & Ali, Fl. West Pakist. 605. 1972; Gamble, Man. Indian Timb., ed. 2, imp. 3, 544. 1973; Mold., Phytologia 31: 412. 1975; Balakrishn., Bull. Bot. Surv. India 16: 169--173. 1977; Balakrishn., Biores. Ind. 15 (4): B.137. 1978; Mold., Phytol. Mem. 2: 255, 257, 259, 346, 379, 386, 460, 461, & 529. 1980; Mold., Phytologia 52: 429, 430, & 433. 1983.

A small, straggling or rambling, fragrant, evergreen shrub or bush, 1.5--5 m. tall; stems erect or arching, to 1.2 cm. in diameter; branches slender, pubescent or tomentose when young, finally glabrescent; twigs often purple or purplish to brown or brownish in color, densely pubescent or tomentose with usually purplish or violet tomentum, but often colored only on one longitudinal side; bark pale-brown; leaves decussate-opposite, the young ones with a fetid smell when crushed; petioles 4--15 mm. long, usually densely purplish- or violet-tomentose, often colored only on one side; leaf-blades soft, membranous, lanceolate, onlong-lanceolate, or ovate-lanceolate to ovate or elliptic, 4--12.5 cm. long, 1.5--6.5 cm. wide, apically acuminate or (usually) caudate, marginally entire or subentire to crenate-serrate, basally rhomboid or cuneate to obtuse or rounded, pale-puberulent above, permanently softly pale-pubescent or -subvillous beneath when mature; secondaries 5--9 pairs, impressed above, prominent beneath; inflorescence cymose to corymbose, usually purplish- or violet-tomentose but often so colored on one side only, the cymes small, short, compact, mostly axillary, 0.6--2.5 cm. long, much shorter than the subtending leaves, 3--8-flowered, dichotomous, densely pubescent, without a common rachis but often raceme-like, 1-sided, horizontally spreading or recurved, usually not forming a terminal panicle; bracts linear or almost subobsolete, 2--3 mm. long, densely pubescent; flowers small, about 0.5 mm. wide, very shortly pedicellate or sessile; flower-buds purplish; calyx during anthesis subpatent-triangular, 2.5--3.5 mm. long, cleft nearly to the middle, usually tinged purple, externally densely puberulent or pubescent, subulate-toothed; corolla white or whitish to cream-color, sometimes purplish or mauve, often white with a pink or purple tinge, externally pubescent and glandulose, its tube 3--6 mm. long, the limb 5--6 mm. wide, the 5 lobes 3.5--5 mm. long, the lowermost largest and apically emarginate, mottled or streaked ventrally

with purplish-red; stamens 4, exserted, purplish; anther thecae apically divergent; pistil longer than the stamens; fruiting-calyx membranous, 3—4 mm. wide, externally pubescent, not ribbed, divided to halfway down, but scarcely enlarged, the lobes triangular and spreading, when completely mature dehiscing into 4 valves; fruit capsular or (when immature) subdrupaceous, globose or subglobose, 2.5—4 mm. long, to 5 mm. wide, externally glabrous or nearly so, somewhat ribbed, slightly 4-lobed, bright-orange to red or rusty-red when ripe, the pericarp thinly fleshy, covered with white resinous specks; seeds 4, surrounded by a juicy pulp.

The species is based on an unnumbered collection made by Hamilton in the Himalayas, probably in Kumaon, and deposited in the British Museum herbarium. The Vitex? sex-dentata of Wallich was based on a collection made, presumably by him, in Nepal in 1821. The Clerodendron gratum of Kurz, referred to in the synonymy (above), is a synonym of Caryopteris paniculata C. B. Clarke.

Collectors have found Caryopteris foetida growing in stony places and scrub forests, at 1300 to 2150 m. altitude, in flower from February to May and in December, and in fruit from March to June. The corollas are described as having been "blue" on Fleming 359, "bluish" on Singh 213, "purple with a yellow center" on White 110, "white" on Malla & Bhandery 726, "whitish-mauve" on Nicolson 3260, and "whitish with reddish-purple marks" on Nicolson 2946.

Vernacular and common names listed for the plant are "bagh", "ghans", "khosarne", "mandhayo", "mukhe", and "strong-scented clerodendron".

It should be noted here that Singh 213 exhibits remarkably small leaves and closely resembles C. odorata (Hamilt.) B. L. Robinson. Possibly it may represent a hybrid.

The Clerodendron foetidum of Bunge, referred to in the synonymy (above) is a synonym of C. bungei Steud., while C. foetidum Hort. is a synonym of C. lindleyi Decaisne. The Volkameria buchanani Roxb., regarded as a synonym of C. foetida by Don (1825) actually is the name-bringing synonym of Clerodendrum buchanani (Roxb.) Walp.

Kurz (1877) lists C. foetida from Ava and the Kakhyan hills of Burma. Osmaston (1927) asserts that it occurs "throughout the hills [of Kumaon] between 5,500 and 7,000 feet. Common in oak forests, usually in north aspects." Oarker (1924) gives its natural distribution as the "Sub-Himalayan tract and Outer Himalaya, 4,000 to 5,500 feet. Common in the Rawalpindi Hills [of Pakistanian Punjab]. Has not been collected between the Jhelum and the Jumma as yet and should be looked for." Clarke (1885) lists it from Kumaon and Nepal, citing unnumbered collections of Strachey & Winterbottom, Thomson, and Wallich. Gupta (1967) found it in Uttar Pradesh. Stewart (1972) avers that it is common not only in the Rawalpindi hills of Pakistan, but also in the provinces of Dhirkot, Gorra, and Poonch, but the only collection which he cites appears to represent C. paniculata C. B.

Clarke. Wallich (1829) cites a specimen from Dehra Dunn, collected in 1826: "C. odorata affinis".

Nicolson refers to C. foetida as an "occasional scrambler in cutover forests" in Nepal. Rau (1961) refers to it as a "shrub on rocks", citing only his no. 10058. Balakrishnan (1977) lists it from Meghalaya, India.

Jafri & Ghafoor, in a personal communication to me, cite Nasir & Ali 5483 and Stewart 25556 from Pakistan, but the latter, at least, actually proves to be C. paniculata. The Koelz 20569, cited below, may represent a case of mixed labels during mounting since the information on the label now accompanying it does not seem to apply at all to the plant material on the sheet.

Sweet (1826) asserts that C. foetida was introduced into cultivation in England in 1820 from Nepal. Gill (1972) reports the chromosome number as $n = 30$, the same number as reported earlier by Löve (1968), based on Mahra & Gill 97. Kapoor and his associates (1969) report the presence of a saponin in the plant.

Material of C. foetida has been misidentified and distributed in some herbaria as C. wallichiana Schau., Callicarpa sp., Clerodendron foetidum Bunge, C. fragrans var. pleniflorum Schau., and Volkameria foetida Buch.-Ham. On the other hand, the Stewart 14864, 15776, & 25556, distributed as C. foetida, actually are C. paniculata C. B. Clarke, while Singh 213 and Stewart 7116, 12075, & 16355 are C. odorata (Hamilt.) B. L. Robinson.

Citations: PAKISTAN: Missoori: R. R. Stewart 13069 (N). North-western States: T. Thomson s.n. [3-6000 ped.] (Pd, S). NEPAL: Collector undesignated [Buchanan-Hamilton?] s.n. [Pherphing, 20th March 1803] (Pd); Ihapa & Pradhan 4387 (W-2581487); Malla & Bhandery 726 (W-2581501); Nicolson 2946 (W-2571600), 3260 (W-2571603); Ram 150 (Ca-396115), Ho.282 (N); Wallich 1759 (Pd, S), s.n. (V). BHUTAN: Griffith 6044 (S). INDIA: Assam: Koelz 24567 (Mi). Sikkim: J. D. Hooker s.n. [4-6000 ped.] (Mu-795, Pd, S); T. Thomson s.n. [1857] (Pd). Uttar Pradesh: Fleming 359 (Mi); Koelz 20569 (Ca-37604); Strachey & Winterbottom 2 (Br). CULTIVATED: Burma: O. E. White 110 (W-2090845). India: Herb. Hort. Bot. Calcutt. s.n. (Mu-1126).

CARYOPTERIS FORRESTII Diels, Notes Roy. Bot. Gard. Edinb. 5: 296. 1912.

Synonymy: Caryopteris forrestii Diels ex Mold., Known Geogr.

Distrib. Verbenac., ed. 1, 56 & 87, sphalm. 1942.

Bibliography: Diels, Notes Roy. Bot. Gard. Edinb. 5: 296 (1912) and 7: 332 & 347. 1913; Fedde & Schust., Justs Bot. Jahresber. 40 (2): 334. 1915; Léveillé, Cat. Pl. Yun-nan 277. 1917; Prain, Ind.

Kew. Suppl. 5, imp. 1, 49. 1921; Stapf, Curtis Bot. Mag. 154: pl. 9219. 1930; P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] 163, 164, & 166-168. 1932; Kingdon Ward, Pl. Hunt. Tibet 17 & 171. 1934; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 56 & 87.

1942; Erdtman, Svensk Bot. Tidsk. 39: 283. 1945; Mold., Alph. List Inv. Names Suppl. 1: 4. 1947; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 130, 131, & 178. 1949; H. N. & A. L. Mold., Pl. Life 2: 59. 1949; Iljin, Acad. Sci. Bot. Inst. Dept. Repr. Mat. Hist. Fl. Veg. USSR. 3: 216. 1958; Mold., Résumé 167, 168, 349, & 445. 1959; Prain, Ind. Kew. Suppl. 5, imp. 2, 49. 1960; Mold., Fifth Summ. 1: 269, 287, & 422 (1971) and 2: 856. 1971; Mold., Phytol. Mem. 2: 256, 276, & 529. 1980; Mold., Phytologia 52: 432 & 433. 1983.

A low aromatic shrub or subshrub, 0.3--1.2 m. tall, often procumbent, with a balsam-like odor, whitish-velutinellous throughout; leaves decussate-opposite; petioles 5--10 mm. [usually not over 5 mm.] long; leaf-blades thickly chartaceous or herbaceous, subobovate or oblong to ovate-oblong, 1.5--5 cm. long, 0.5--2.5 cm. wide, apically rather obtuse, basally narrowed, bright-green above, softly mealy-white-tomentellous beneath; secondaries 3--5 per side, the midrib and secondaries prominent beneath; inflorescence conspicuously pedunculate, terminal and [mostly] also in the axils of the upper leaves, corymbose, whitish-velutinellous throughout, without bracts or bracteoles; flowers pedicellate; calyx greenish-yellow, subequally 5-toothed or -fid, the tube 1.5--2.5 mm. long, rounded, externally pubescent, internally glabrous, the teeth or segments narrowly lanceolate, rather thick-textured, 2--2.5 mm. long, apically obtuse, interiorly tomentose-margined; corolla greenish-white or white to yellow or even pale-blue, externally velutinellous, 5-lobed, the tube straight, slightly gibbous, short, only 2.5--3 mm. long, interiorly villous or barbate at the stamen-insertion, the 4 upper lobes ovate, subequal, about 1.5 mm. long and 1.2 mm. wide, apically obtuse, the 5th (lower) one larger, 3--4 mm. long, concave, apically deeply 3-toothed or -fid, pubescent on both surfaces; stamens exserted about 5 mm. from the corolla-mouth; style glabrous, apically minutely bilobed; basal disk about half as long as the ovary; ovary apically pubescent and glandulose; fruiting-calyx 4--5 mm. wide; capsule 2 mm. wide, externally hirsute, apically glandulose; nutlets semi-obovate, 2--2.5 mm. long, dorsally puberulent, marginally subalate, centrally flat.

This species is based on G. Forrest 79 from dry stony ground at the head of the Teng Chuan valley, at 8000 feet altitude, in flower, and G. Forrest 100 from dry limestone country in the valley of the Yangtse river below Pung Tau La, at 9000 feet altitude, in fruit, both collections made in September, 1904, in Yunnan, China, and both deposited in the herbarium of the Royal Botanical Garden at Edinburgh. The collector describes the first gathering as from a shrub, 3--4 feet tall, with greenish-white "flowers" [corollas], and the second as a shrubby plant, 1--2 feet tall, usually prostrate. Diels (1912) notes that the second collection is obviously from a more xerophytic area, "having more spreading branches and considerably smaller leaves". He asserts that the species is "allied to C. mongholica, Maxim., but the leaves are larger and the flowers very much smaller." It may be noted that

similar spreading, often prostrate, branches can be seen in C. incana f. nana (Borsch) Mold.

The corollas of C. forrestii are described as having been "yellowish-white" on Rock 9046 & 10591, "whitish-green" on Rock 6571, "pale-yellow" on Forrest 20503 & 20522, "dull-yellow" on Forrest 10432, "yellowish" on Maire B.6684, "yellow" on Rock 10541, "white" on Rock 6398, and "pale-blue, drying white" or "greenish-white" on Forrest 14599.

Collectors have found C. forrestii growing among limestone rocks, in rocky-pebbly soil on dry slopes, in open pastures and meadows on mountainsides, in dry open situations among boulders, and on cliffs and dry open hillsides, at 300—2700 m. altitude, in flower from July to September and November, and in fruit in September.

P'ei (1932) comments that "This species occurs at high altitudes on the border between Szech'uan Province and Tibet, southward to the border between Yunnan and Burma. Its allied species is Caryopteris mongholica Bunge from which it differs by its ovate-oblong leaves, greenish-yellow flowers and the toothed lower corollalobe." He cites Forrest 20523 from Szechuan, Forrest 10432 & 14599, Handel-Mazzetti 700 & 1977, Maire 3830, Rock 6398, 9046, 10541, & 10591, Schneider 2687, and Ten 556 from Yunnan, and Forrest 19143 from Tibet.

Erdtman (1945) asserts that the pollen of C. forrestii is of the same type as that of C. incana (Thunb.) Miq., C. mongholica Bunge, C. odorata (Hamilt.) B. L. Robinson, C. paniculata C. B. Clarke, C. tangutica Maxim., and C. trichosphaera W. W. Sm., basing his conclusions on Forrest 10432; namely, it has tricolpate grains, but unlike those of C. odorata, they are subprolate.

It may be noted here that the unidentified species of Caryopteris described by Kingdon Ward (1934) from Tibet is probably C. forrestii, the only one known to me from that country. He remarks that it is a member of the plateau flora there, "with a stocky trunk immediately spraying up into a dome of twigs bearing innumerable tiny leaves and pale flowers". It is obviously a part of the Tibetan xerophytic flora.

Citations: CHINA: Szechuan: Forrest 20503 (Ca—253058, W—1278916). Yunnan: Forrest 10432 (Ca—224617, Ca—230729, N, N—photo, S), 14599 (W—1860099); Maire B.3830 (Ca—386799), B.6684 (Ca—386970, N, W—1291769), s.n. [September 1910] (V); Rock 6398 (Ca—327686, N, W—1332128), 6571 (Ca—328189, N, W—1511067), 9046 (Ca—327841, W—1332129), 10541 (Ca—327494, W—1332130), 10591 (Ca—327215, W—1332131); Ten 556 (W—1058269).

CARYOPTERIS GLUTINOSA Rehd. in Sarg., Pl. Wils. 3: 378. 1916.

Bibliography: Rehd. in Sarg., Pl. Wils. 3: 378. 1916; A. W. Hill, Ind. Kew. Suppl. 6: 38. 1926; P'ei, Mem. Sci. Soc. China 1

(3): [Verbenac. China] 163, 164, & 166, pl. 31. 1932; Rehd., Man. Cult. Trees, ed. 2, 806 & 933. 1940; Worsdell, Ind. Lond. Suppl. 1: 190. 1941; Kelsey & Dayton, Stand. Pl. Names, ed. 2, 92. 1942; Mold., Known Geogr. Distrib. Verbenac., ed. 1, 56, 71, & 87. 1942; Erdtman, Svensk Bot. Tidsk. 39: 281 & 283. 1945; Mold., Known Geogr. Distrib. Verbenac., ed. 2, 131, 157, & 178. 1949; Rehd., Bibliog. Cult. Trees Shrubs 586. 1949; Bean, Trees Shrubs Hardy Brit. Isls., ed. 7, 1: 366. 1950; Iljin, Acad. Sci. Bot. Inst. Dept. Repr. Mat. Hist. Fl. Veg. USSR. 3: 216. 1958; Mold., Résumé 168, 214, & 445. 1959; Bean, Trees Shrubs Hardy Brit. Isls., ed. 8, 1: 518. 1970; Mold., Fifth Summ. 1: 287 & 356 (1971) and 2: 856. 1971; Mold., Phytol. Mem. 2: 276, 346, & 529. 1980; Mold., Phytologia 52: 432 & 434. 1983.

Illustrations: P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] pl. 31. 1932.

An erect shrub, 0.8—1.5 m. tall, the young shoots downy; leaves decussate-opposite; petioles short; leaf-blades somewhat fleshy, lanceolate, dark-green, 1.2—2.5 cm. long, 3—6 mm. wide, glutinous and shiny above, marginally entire and revolute or occasionally with a few triangular teeth, mealy-white-tomentose with dark glabrescent venation beneath; inflorescence axillary, the flowers in dense many-flowered cymes in the uppermost leaf-axils; corolla blue, about 6 mm. long, externally grayish-downy-pubescent, with a ring of long white hairs at the mouth of the tube; ovary externally downy-pubescent.

The species is based on E. H. Wilson 4309 from the Hin River valley in western Szechuan, collected in 1903 and deposited in the Arnold Arboretum herbarium. Bean (1970) asserts that "It is most closely akin to *C. mongolica*, but is a taller shrub with the corolla hairy at the mouth and viscid leaves. It is a handsome plant, blooming in September. Wilson was collector for Messrs. Veitch when he encountered this plant and made it available for cultivation in England and America."

Collectors have encountered *C. glutinosa* at 1600—1800 m. altitude, flowering in September, describing it as a shrub, 2—5 feet tall. The corollas are said to have been "pale-blue" on Wilson 4309 and "purplish-blue" on Fang 5502.

P'ei (1932) says that "This is a beautiful plant, the leaves being glutinous and shining above and mealy white with black veins beneath. It is closely related to *Caryopteris mongholica* Bunge from which it differs by its shorter corolla-tube which is about 0.3 cm. in length, the shortly fimbriated lower corolla-lobe, and the pubescent ovary. It is much taller than *C. mongholica* Bunge, being 2 to 5 feet in height, but the leaf-shape is similar to it. It is also allied to *C. Forrestii* Diels, differing by its linear leaves and purplish-blue flowers, *C. Forrestii* Diels having ovate-oblong leaves and greenish-yellow flowers."

Erdtman (1945) places *C. glutinosa*, based on its pollen morphology, in the same group of species as *C. forrestii* Diels, *C. incana* (Thunb.) Miq., *C. mongholica* Bunge, *C. tangutica* Maxim., and

C. trichosphaera W. W. Sm.

The Mulligan s.n. [October 1, 1936], distributed as C. glutinosa, actually is C. incana (Thunb.) Miq.

Citations: CHINA: Szechuan: E. H. Wilson 4309 (N—photo of type). MOUNTED ILLUSTRATIONS: P'ei, Mem. Sci. Soc. China 1 (3): pl. 31. 1932 (Ld).

CARYOPTERIS INCANA (Thunb.) Miq., Ann. Mus. Bot. Lugd.-Bat. 2: 97. 1865

Synonymy: Nepeta incana Thunb. ex Houtt., Natuurl. Hist. Pl. 2 (9): 307, pl. 56, fig. 2. 1778. Nepeta japonica Willd. in L., Sp. Pl., ed. 4, 3: 52. 1800. Caryopteris mastacanthus Schau. in A. DC., Prodr. 11: 625. 1847. Caryopteris ovata Miq., Journ. Bot. Néerl. 1: 144. 1861. Caryopteris incana Miq. apud Maxim., Bull. Acad. Imp. Sci. St.-Petersb. 23: 889. 1877. Caryopteris tangutica Maxim., Bull. Acad. Imp. Sci. St.-Petersb. 27: 525—526. 1882. Caryopteris tangutica var. brachydonta Hand.-Mazz., Act. Hort. Gotob. 9: 68. 1934. Caryopteris incana Farrington, N. Y. Herald Trib. July 25, 2: 14, sphalm. 1937. Caryopteris incana var. brachydonta (Hand.-Mazz.) Mold., Phytologia 2: 13. 1941. Caryopteris incana Moq. ex Mold., Alph. List Inv. Names Suppl. 1: 4, in syn. 1947. Mastacanthus sinensis Lindl. ex Mold., Alph. List Inv. Names Suppl. 1: 16, in syn. 1947. Caryopsis incana Tamm, Arch. Mikrobiol. 20: 281, sphalm. 1954. Caryopteris mastacantha Schau. ex Mold., Résumé 249, in syn. 1959. Caryopteris incana Maxim. ex Mold., Résumé 249, in syn. 1959. Caryopteris mastacanthus Schau. ex Mold., Résumé 249, in syn. 1959. Caryopteris incana Miq. ex Mold., Résumé Suppl. 3: 30, in syn. 1962. Nepta incana Thunb. apud Li, Woody Fl. Taiwan 824 & 960, sphalm. 1963. Caryopteris incana (Houtt.) Miq. apud Piranger, Downes, & Borthwick, Am. Journ. Bot. 50: 86. 1963. Nepeta incana Houtt. apud Bean, Trees Shrubs Hardy Brit. Isls., ed. 8, 1: 518, in syn. 1970. Caryopteris tangutica var. brachydonta Hand.-Mazz. ex Mold., Fifth Summ. 2: 423, in syn. 1971. Caryopteris incana var. brachydonta (Hand.-Mazz.) Mold., Fifth Summ. 2: 423, in syn. 1971. Caryopteris incana (Thunb. ex Houtt.) Miq. apud Encke & Buchheim in Zander, Handwörterb. Pflanzennam., ed. 10, 158. 1972. Caryopsis incana (Thunb. ex Houtt.) Miq. apud Cleene & DeLey, Bot. Rev. 42: 411 & 412. 1976. Caryopteris incanus Miq. ex Mold., Phytol. Mem. 2: 379, in syn. 1980. Carypteris incania Miq., in herb.

Bibliography: Houtt., Lin. Pfl. Syst. 2 (7): 429, pl. 56, fig. 2. 1777; Houtt., Natuurl. Hist. 2 (9): 307, pl. 56, fig. 2. 1778; Thunb., Fl. Jap. 244. 1784; Lour., Fl. Cochinch., ed. 1, 2: 366—367 (1790) and ed. 2, 2: 444. 1793; Willd. in L., Sp. Pl., ed. 4, 3: 52. 1800; Pers., Sp. Pl. 3: 339. 1819; Hook. & Arn., Bot. Beech. Voy. 205. 1836; Endl., Gen. Pl. 638. 1838; Steud., Nom. Bot. Phan., ed. 2, 2: 105. 1841; D. Dietr., Syn. Pl. 3: 619. 1843; Walp., Repert. Bot. Syst. 4: [3]. 1845; Lindl., Edwards Bot. Reg. 32 [ser. 2, 19]:

pl. 2. 1846; Sieb. & Zucc., Abhandl. Akad. Wiss. Muench. Math.-Phys. 4 (3): 156--157. 1846; Schau. in A. DC., Prodr. 11: 625. 1847; Walp., Repert. Bot. Syst. 6: 686. 1847; Benth. in Hook. f., Journ. Bot. Kew Gard. Misc. 5: 135. 1853; Buek, Gen. Spec. Syn. Candoll. 3: 86. 1858; Benth., Fl. Hongk. 268. 1861; Miq., Journ. Bot. Néerl. 1: 114. 1861; Bocq. in Baill., Rec. Obs. Bot. [Adanson, ser. 1] 3: 208, pl. 19. 1863; Bocq., Rév. Verbenac. 110 & 208, pl. 19. 1863; Miq., Prolus. Fl. Iap. 29. 1865; Maxim., Bull. Acad. Imp. Sci. St. Pétersb. 31: 87. 1866; Miq., Ann. Mus. Bot. Lugd.-Bat. 2: 97. 1866; Miq., Cat. Mus. Bot. Lugd.-Bat. 70. 1870; Hance, Journ. Linn. Soc. Lond. Bot. 13: [Fl. Hongk. Suppl.] 116. 1873; Ufma, Somoku Dzusetsu, ed. 1, 11: pl. 11. 1875; Franch. & Savat., Enum. Pl. Jap. 1: 357--358. 1875; Benth. in Benth. & Hook. f., Gen. Pl. 2 (2): 1157. 1876; Maxim., Bull. Acad. Imp. Sci. St.-Pétersb. 23: 389. 1877; Maxim., Bull. Soc. Nat. Mosc. 54: 41. 1879; Maxim., Mém. Biol. Acad. Imp. Sci. St.-Pétersb. 11: 301. 1882; Maxim., Bull. Acad. Imp. Sci. St.-Pétersb. 27: 525--526. 1882; W. Robinson, Garden 24: 523. 1883; Anon., Gard. Chron., ser. 2, 21: 148 & 149, fig. 30. 1884; Hance, Journ. Linn. Soc. Lond. Bot. 8: 144. 1885; Henriq., Bolet. Bot. Soc. Brot. 3: 144. 1885; Hook. f., Curtis Bot. Mag. 111 [ser. 3, 41]: pl. 6799. 1885; Olivier, Handelsbl. Tuinb. Sempervirens 14: [117] & 220. 1885; Maxim., Mém. Biol. Acad. Imp. Sci. St.-Pétersb. 12: 523. 1886; Maxim., Bull. Acad. Imp. Sci. St.-Pétersb. 31: 87. 1886; Dippel, Handb. Laubholz. 1: 59, fig. 24. 1889; Forbes & Hemsl., Journ. Linn. Soc. Lond. Bot. 26 [Ind. Fl. Sin. 2]: 263--265. 1890; Verdier, Journ. Soc. Nat. Hort. France, ser. 3, 12: 574. 1890; Hardy, Journ. Soc. Nat. Hort. France, ser. 3, 13: 598. 1891; André, Rév. Hort. 64: 324--325. 1892; Bernard, Rév. Hort. Belg. 19: 272--274. 1893; Koehne, Dendrol. 527. 1893; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 1, 1: 272 & 447 (1893) and imp. 1, 2: 175. 1894; Briq. in Engl. & Prantl, Nat. Pflanzenfam., ed. 1, 4 (3a): 178. 1895; Gourolot, Le Jardin 9: 161. 1895; L. Henry, Le Jardin 9: 74. 1895; Legros, Rév. Hort. 67: 331--332. 1895; Ville, Bull. Soc. Tosc.ortic. 21 [ser. 3, 1]: 220--221, fig. 13. 1896; Linden, Semaine Hort. 2: 89, fig. 229. 1898; L. H. Bailey, Cycl. Amer. Hort. 255, fig. 379. 1900; Diels, Engl. Bot. Jahrb. 29: 550. 1900; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 1, 84. 1901; L. H. Bailey, Cycl. Amer. Hort. pl. 47. 1902; Diels, Fl. Cent.-China 550. 1902; Schelle in Beissner, Schelle, & Zabel, Laubholz-Benen. 426. 1903; C. K. Schneid., Dendrol. Winterst. 120, 201, & 267, fig. 122. 1903; Tillier, Rév. Hort. 75: 15--17, fig. 4. 1903; Spooner, Gard. Chron., ser. 3, 42: 408 & 409, fig. 171. 1907; D. H. Scott in Solered. [transl. Boodle & Fritsch], Syst. Anat. Dicot. 1: 634. 1908; Apgar, Orn. Shrubs U. S. 289, fig. 502. 1910; Gérôme, Le Jardin 24: 381, fig. 224. 1910; Kawakami, List Pl. Formos. 84. 1910; Danguy, Bull. Mus. Nat. Hist. Nat. Paris 17: 344. 1911; Nakai, Fl. Korea 2: 137. 1911; C. K. Schneid., Illust. Handb. Laubh. 2: 587 & 595--596, fig. 282 m--o & 386 k--p. 1911; Dunn & Tutchter, Kew Bull. Misc. Inf. Addit. Ser. 10: 205. 1912; "A. C." in F. W. Harvey, Garden 76: 24. 1912; Makino, Somoku Dzusetsu [Icon. Pl. Nipp.], ed. 2, 11: pl. 11. 1912; Matsum., Ind. Pl. Jap.

2 (2): 531. 1912; Matsum., Bot. Mag. Tokyo 27: 274. 1913; L. H. Bailey, Stand. Cycl. Hort. 1: 679, fig. 832. 1914; Bean, Trees Shrubs Hardy Brit. Isls., ed. 1, 1: 301 (1914) and ed. 2, imp. 1, 1: 301. 1916; O. G. Petersen, Traeer Buske 437. 1916; Rehd. in Sarg., Pl. Wils. 3: 378. 1916; Cowley, Garden 81: 477—[478]. 1917; W. W. Sm., Notes Roy. Bot. Gard. Edinb. 10: 18. 1917; W. Trelease, Wint. Bot. 332. 1918; Dreer, Gard. Book 80: 184 (1918) and 81: 174. 1919; Bean, Trees Shrubs Hardy Brit. Isls., ed. 2, imp. 2, 1: 301. 1919; Dreer, Gard. Book 82: 169. 1920; Bean, Trees Shrubs Hardy Brit. Isls., ed. 3, 1: 301. 1921; Bean, Kew Bull. Misc. Inf. 1922: 110—111. 1922; Breslau, Feddes Repert. Spec. Nov. Beih. 12: 475. 1922; Bean, Garden 88: 183—184. 1924; Chung, Mem. Sci. Soc. China 1 (1): 228. 1924; Dreer, Gard. Book 86: 174. 1924; Makino, Illust. Fl. Jap. [216]. 1924; Olmsted, Coville, & Kelsey, Stand. Pl. Names, ed. 1, 70. 1924; L. H. Bailey, Man. Cult. Pl., ed. 1, imp. 1, 634, 802, & 805 (1924) and ed. 1, imp. 2, 634, 802, & 805. 1925; Bean, Trees Shrubs Hardy Brit. Isls., ed. 4, 1: 301. 1925; Koidzumi, Bot. Mag. Tokyo 40: 333. 1926; Borsch, Hardy Herb. Alp. Pl. 8. 1927; Itô, Icon. Pl. Formosa pl. 349. 1927; Kirk, Brit. Gard. Fls. 432. 1927; Rehd. in Rehd. & Wils., Journ. Arnold Arb. 8: 195. 1927; Hottes, Book Shrubs, ed. 1, 151—152. 1928; Kränzlin, Mitt. Deutsch. Dendrol. Gesel. 40: 135. 1928; Rehd. in Rehd. & Wils., Journ. Arnold Arb. 9: 112. 1928; Sasaki, List Pl. Formosa 350. 1928; Bean, Trees Shrubs Hardy Brit. Isls., ed. 5, 1: 301. 1929; E. H. Wils., China Mother Gard. 23. 1929; L. H. & E. Z. Bailey, Hortus, ed. 1, 124. 1930; E. D. Merr., Sunyat. 1 (1): 30. 1930; Stapf, Ind. Lond. 2: 82. 1930; Hottes, Book Shrubs, ed. 2, 176—177. 1931; W. Trelease, Wint. Bot., ed. 3, imp. 1, 334. 1931; Bonstedt in Encke, Pareys Blumengärt., ed. 1, 282—283 & 662. 1932; P'ei, Mem. Sci. Soc. China 1 (3): [Verbenac. China] 163, 164, & 168—173. 1932; P'ei, Sinensia 2: 76—77. 1932; Schelle, Pareys Blumengärt., ed. 1, 282—283. 1932; Wilder, Frag. Path, imp. 1, 113 & 385. 1932; Bean, Trees Shrubs Hardy Brit. Isls. 3, ed. 1, 75. 1933; Fedde, Justs Bot. Jahresber. 51 (2): 269. 1933; Tu, Chinese Bot. Dict., abrdgd. ed., 662 & 663. 1933; Chittenden, Journ. Roy. Hort. Soc., ser. 3, 59: 226. 1934; Dreer, Gard. Book [96]: 130. 1934; Hand.-Mazz., Act. Hort. Gotob. 9: 68. 1934; Junell, Symb. Bot. Upsal. 1 (4): 115, 116, 118, & 119, fig. 183 & pl. 7, fig. 4. 1934; Zander, Gross. Gart.-Lex. 131. 1934; L. H. & E. Z. Bailey, Hortus, ed. 2, 124. 1935; L. H. Bailey, List Florists Handl. Verbenac. [mss.]. 1935; Bobbink & Atkins, Roses Ornament. Trees Shrubs 52 & 59. 1935; Dop in Lecomte, Fl. Gén. Indo-Chine 4: 874 & 885, fig. 90. 1935; E. D. Merr., Trans. Am. Philos. Soc., ser. 2, 24 (2): 338 & 419. 1935; Bean, Trees Shrubs Hardy Brit. Isls. 3, ed. 2, 75. 1936; Bedevian, Illust. Polyglot. Dict. 150—151. 1936; Dreer, Gard. Book [97]: 21, 117, & 131 (1935) and [98]: 5, 21, & 121. 1936; Hillier, Journ. Roy. Hort. Soc. 61: 107. 1936; Makins, Ident. Trees Shrubs, ed. 1, 46 & 258, fig. 346. 1936; Wangerin, Justs Bot. Jahresber. 56 (1): 669. 1936; Wilder, Frag. Path, imp. 2, 113 & 385. 1936; Farrington, N. Y. Herald Trib. July 25, 2: 14.

- 1937; Wangerin, *Justs Bot. Jahresber.* 57 (1): 696. 1937; L. H. Bailey, *Man. Cult. Pl.*, ed. 1, imp. 3, 634, 802, & 805. 1938; Dahlgren, *Svensk Bot. Tidsk.* 32: 231. 1938; Fedde, *Justs Bot. Jahresber.* 57 (2): 742. 1938; Hao, *Engl. Bot. Jahrb.* 68: 633. 1938; H. W. Harv., *Ga. Univ. Agr. Ext. Serv. Bull.* 402: 34. 1938; E. D. Merr., *Journ. Arnold Arb.* 19: 362. 1938; Terazaki, *Nippon Shokubutsu Zufu* [Nature-Col. Wild Pl.] fig. 2489. 1938; Fedde, *Justs Bot. Jahresber.* 58 (2): 505. 1939; Hand.-Mazz., *Act. Hort. Gotob.* 13: 336. 1939; Mold., *Annot. List* 108. 1939; Sakata, *Reliable Seeds Nursery* 1939: 28. 1939; Bobbink & Atkins, [Catalogue] 1940: 67. 1940; Makino, *Illustr. Fl. Nipp.* 185, fig. 554. 1940; Rehd., *Man. Cult. Trees Shrubs*, ed. 2, imp. 1, 806 & 933. 1940; W. Trelease, *Pl. Mat. Decorat. Gard. Woody Pl.*, ed. 5, imp. 1, 145. 1940; Anon., *Gard. Chron.*, ser. 3, 110: 110. 1941; L. H. Bailey, *Man. Cult. Pl.*, ed. 1, imp. 4, 634, 802, & 805. 1941; L. H. & E. Z. Bailey, *Hortus Sec.*, imp. 1, 145. 1941; Bobbink & Atkins, [Catalogue] 1941: 43. 1941; Doney, *Brooklyn Bot. Gard. Rec.* 30: 23. 1941; Durand & Jacks., *Ind. Kew. Suppl.* 1, imp. 2, 84. 1941; Heydenreich, *Gartenschönnh.* 22: 92. 1941; Mold., *Phytologia* 2: 13. 1941; Mold., *Suppl. List Inv. Names* [1], 2, & 6. 1941; Sakata, *Reliable Seeds Nursery* 1941: 54. 1941; E. H. Walker, *Contrib. U. S. Nat. Herb.* 28: 655. 1941; Worsdell, *Ind. Lond. Suppl.* 1: 190. 1941; Hottes, *Book Shrubs*, ed. 4, 176—177. 1942; Kelsey & Dayton, *Stand. Pl. Names*, ed. 2, 92 & 93. 1942; Mold., *Alph. List Inv. Names* 6, 12, & 23. 1942; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 1, 56, 58, 71, & 87. 1942; L. H. Bailey, *Man. Cult. Pl.*, ed. 1, imp. 5, 634, 802, & 805. 1944; E. L. D. Seymour, *New Gard. Encycl.*, ed. 3, 154. 1944; Erdtman, *Svensk Bot. Tidsk.* 39: 283—284. 1945; Mold., *Phytologia* 2: 95. 1945; Jacks. in *Hook. f. & Jacks, Ind. Kew.*, imp. 2, 1: 272 & 447 (1946) and imp. 2, 2: 175. 1946; Mold., *Alph. List Inv. Names Suppl.* 1: 4 & 16. 1947; P'ei, *Bot. Bull. Acad. Sin.* 1: 6. 1947; Hara, *Enum. Sperm. Jap.*, imp. 1, 1: 186—187. 1948; Makins, *Ident. Trees Shrubs*, ed. 2, 46, 289, & 355, fig. 34L. 1948; L. H. Bailey, *Man. Cult. Pl.*, ed. 2, 845—846, 1042, & 1047. 1949; "R. G.", *N. Y. Times* August 28, 10: 23. 1949; Mold., *Known Geogr. Distrib. Verbenac.*, ed. 2, 131, 133, 134, 157, & 178. 1949; Rehd., *Bibliog. Cult. Trees* 585—586. 1949; Turrill, *Curtis Bot. Mag.* 166: pl. 75. 1949; Bean, *Trees Shrubs Hardy Brit. Isls.*, ed. 7, 1: 365—367. 1950; P. Henderson, *Everything Gard.* 120. 1950; Hottes, *Book Shrubs*, ed. 5, 176—177. 1950; Metcalfe & Chalk, *Anat. Dicot.* [1034], fig. 247E. 1950; A. W. Anderson, *How We Got Fls.*, imp. 1, 213 & 271. 1951; Kelly Bros., 1951 *Gard. Book* 44. 1951; Rehd., *Man. Cult. Trees Shrubs*, ed. 2, imp. 2, 806 & 933. 1951; Blackburn, *Trees Shrubs East. N. Am.* 108 & 329. 1932; Hottes, *Book Shrubs*, [ed. 6, imp. 1], 176—177. 1952; *Wayside Gard., Horticulture* 31: 175. 1953; Mold., *Journ. Calif. Hort. Soc.* 15: 87. 1954; Tamm, *Arch. Mikrobiol.* 20: 281. 1954; Plaumann, *Gartenwelt* 18: 285. 1955; Bean in Chittenden, *Roy. Hort. Soc. Dict. Gard.* 1: 405—406. 1956; Boerner in Maatsch, *Illust. Gartebaulex.* 1: 205. 1956; Wyman, *Shrubs Vines Am. Gard.* 121, 122, & 415. 1956; Anon., *U. S. Dept. Agr. Bot. Subj. Ind.* 15: 14354.

1958; Iljin, Acad. Sci. Bot. Inst. Dept. Repr. Mat. Hist. Fl. Veg. USSR. 3: 216. 1958; Mattoon, Pl. Buyers Guide, ed. 6, 88. 1958; Mold., Am. Midl. Nat. 59: 335. 1958; Hottes, Book Shrubs, [ed. 6, imp. 2], 176—177 (1958) and [ed. 6, imp. 3], 176—177. 1959; R. M. Carleton, Ind. Comm. Names Herb. Pl. 16 & 85. 1959; Durand & Jacks., Ind. Kew. Suppl. 1, imp. 3, 84. 1959; Hara, Outline Phyto-geogr. Japan 69. 1959; Hay, Gard. Chron. 145: 411. 1959; Mold., Résumé 168, 171—173, 214, 237, 249, 250, 319, 321, & 445. 1959; Nut Trees Nurseries, Spring '59 Price List. 1959; Encke, Pareys Blumengärtn., ed. 2, 2: 449. 1960; Jacks. in Hook. f. & Jacks., Ind. Kew., imp. 3, 1: 272 & 447 (1960) and imp. 3, 2: 175. 1960; Mold., Résumé Suppl. 2: 6. 1960; E. H. Walker, Bibliog. East. Asiat. Bot. Suppl. 1: 234. 1960; Runner, Rep. Groff Coll. 362. 1961; Wils., Hedden, & Walker, U. S. Dept. Agr. Bur. Pl. Ind. Pl. Disease Reporter 45: 380—383. 1961; R. M. Carleton, Ind. Comm. Names Herb. Pl., imp. 2, 16 & 85. 1962; Mold., Résumé Suppl. 3: 19, 27, & 30. 1962; Nair & Rehman, Bull. Nat. Bot. Gard. Lucknow 76: 19 & 21, fig. 25. 1962; J. D. Wils & Hedden, U. S. Dept. Agr. Bur. Pl. Ind. Pl. Disease Reporter 46: 186—188, fig. 1—3. 1962; Bush-Brown, Shrubs Trees Home Landsc. 77—79, [205], & 206, fig. 23. 1963; Graf, Exotica 3: 1568. 1963; Li, Woody Fl. Taiwan 17, 824, 825, 944, & 960, fig. 331. 1963; Piringer, Downes, & Borthwick, Am. Journ. Bot. 50: 86. 1963; Schmelzer, Phytopath. Zeitschr. 46: [235]. 1963; Sharma & Mukhophyay, Journ. Genet. 58: 359, 370—371, 377, 380, 383, & 384, pl. 11 & 12, fig. 43—48. 1963; E. B. Anderson in Anderson, Balf., Fish, Wallis, & Finnis, Oxford Book Gard. Fls., imp. 1, 171 (1963) and imp. 2, 171. 1964; Cave, Ind. Pl. Chromos. Numb. 2: 330. 1964; Lord, Shrubs Trees Austral. Gard., ed. 2, 254. 1964; Yotaro, Gard. Pl. World 2: 49, pl. 25, fig. 2. 1964; Bose, Handb. Shrubs 9: 17, 36, 104, & 122. 1965; J. & L. Bush-Brown, Am. Gard. Book, ed. 4, 252, 269, & 378. 1965; Garibaldi, Atti Giorn. Stud. Prop. Spec. Legn. Pisa 1964: 145—154. 1965; R. E. & C. R. Harrison, Trees Shrubs 47, pl. 127. 1965; Hoag, Trees Shrubs North. Plains 206. 1965; Ohwi, Fl. Jap. 766. 1965; N. Taylor, Guide Gard. Shrubs Trees 335 & opp. 342, fig. 8. 1965; A. W. Anderson, How We Got Fls., imp. 2, 213 & 271. 1966; Everett, Readers Digest Compl. Book Gard. 420, 660, & 681. 1966; Giraud, Bull. Soc. Nat. Hortic. France 139 [Jard. Fr. 10 (2F)]: 374. 1966; Hellyer, Shrubs Colour 24—25. 1966; DeWit, Pl. World High. Pl. 2: 185. 1967; Glasau, Sommergr. Ziergeh. 67. 1967; Harlan & Jenkins, Biol. Abstr. 48: 5997. 1967; Harlan & Jenkins, U. S. Dept. Agr. Bur. Pl. Ind. Pl. Disease Reporter 51: 103—107. 1967; E. Lawrence, South. Gard., ed. 2, 183 & 216. 1967; Pal & Krishnamurthi, Flow. Shrubs 21—22, 132, 133, & 146. 1967; Rehd., Man. Cult. Trees Shrubs, ed. 2, imp. 11, 806 & 933. 1967; Tingle, Check List Hong Kong Pl. 38. 1967; W. Trelease, Wint. Bot., ed. 3, imp. 2, 334. 1967; Mold., Résumé Suppl. 15: 14 (1967), 16: 19 (1968), and 17: 7. 1968; E. B. Anderson in Anderson, Balf., Fish, Wallis, & Finnis, Oxford Book Gard. Fls., imp. 3, 171. 1968; Cathey, Proc. Amer. Soc. Hort. Sci. 93: 693—698. 1968; Hyland, U. S. Dept. Agr. Pl. Invent. 1967: 19. 1968; Jaitly, Guignard, & Mestre, Comp. Rend. Acad. Sci. Paris 267D: 59—61, fig. 1—13, &

pl. 1, fig. 1—4. 1968; Schmelzer & Schmidt, *Phytopath. Zeitschr.* 62: [105], 106, 108, 124, & 125. 1968; Stucchi, *FIORI* 11: 129. 1968; W. Trelease, *Pl. Mat. Decorat. Gard. Woody Pl.*, ed. 5, imp. 2, 145. 1968; Bolkh., Grif, Matvej., & Zakhar., *Chromos. Numb. Flow. Pl.*, imp. 1, 714. 1969; Coats, *Pl. Hunters* 106. 1969; Fogg, *Concise Guide Shrubs* 30 & 31. 1969; Schmelzer & Schmidt, *Hort. Abstr.* 39: 135. 1969; Syngé, *Suppl. Dict. Gard.*, ed. 2, 227 & 239. 1969; Barbey, *Arbor. Ornament.*, ed. 4, 72. 1970; Bean, *Trees Shrubs Hardy Brit. Isls.*, ed. 8, 1: 518—519. 1970; Cathey, *Hort. Abstr.* 40: 185. 1970; El-Gazzar & Wats., *New Phytol.* 69: 483 & 485. 1970; Grubov, Ivanina, & Tschernava, *Pl. Asiat. Cent.* 5: 6 & 8. 1970; "A. R.", *Biol. Abstr.* 51: 13600. 1970; Schmelzer, *Phytopath. Zeit.* 67: 292. 1970; D. R. W. Alexander, *Hong Kong Shrubs* 21. 1971; Mold., *Fifth Summ.* 1: 287, 292—294, 307, 309, 313, 356, 395, 422, & 423 (1971) and 2: 571, 573, & 856. 1971; Wyman, *Gard. Encycl.*, imp. 1, 191 & 760 (1971) and imp. 2, 191 & 760. 1972; E. B. Anderson in Anderson, Balf., Fish, Wallis, & Finnis, *Oxford Book Gard. Fls.*, imp. 4, 171. 1972; Anon., *U. S. Dept. Agr. Pl. Sci. Res. Div. Home Gard. Bull.* 181: 2 & 20. 1972; R. Bailey, *Good Housekeep. Illust. Encycl. Gard.* 4: 502. 1972; Encke & Buchheim in Zander, *Handwörterb. Pflanzennam.*, ed. 10, 158. 1972; Hara, *Enum. Sperm. Jap.*, imp. 2, 1: 186—187. 1972; Huang, *Pollen Fl. Taiwan* 243, pl. 162, fig. 4—6. 1972; F. Perry, *Fls. World* 304 & 313. 1972; Queens Bot. Gard. Soc., *Pl. Seaside Gard.* 1. 1972; Queens Bot. Gard. Soc., *Shrubs Area* [2]. 1972; Skinner, *Ornament. Pl. Coast. Northw.* 75. 1972; Anon., *Biol. Abstr.* 56 (3): B.A.S.I. C. S.39. 1973; Anon., *Ind. Sem. Agrartud. Egyet. G8d8118* [Hungary] 1973: 19. 1973; Hegnauer, *Chemotax. Pfl.* 6 [Chem. 21]: 661 & 666. 1973; Huxley, Hardwicke, & Toogood, *Decid. Trees* 30, 151, & 211. 1973; Mold., *Biol. Abstr.* 56: 1243. 1973; L. H. & E. Z. Bailey, *Hortus Sec.*, imp. 18, 145. 1974; Bolkh., Grif, Matvej., & Zakhar., *Chromos. Numb. Flow. Pl.*, imp. 2, 714. 1974; El-Gazzar, *Egypt. Journ. Bot.* 17: 75 & 78. 1974; Gibbs, *Chemotax. Flow. Pl.* 3: 1753. 1974; Hersey, *Flow. Shrubs Small Trees* 50, fig. 109. 1974; Hocking, *Excerpt. Bot. A.* 23: 291. 1974; Mold., *Phytologia* 28: 446. 1974; F. Perry, *Compl. Guide Plants Fls.* pl. 418. 1974; Rehd., *Man. Cult. Trees Shrubs*, ed. 2, imp. 12, 806 & 933. 1974; Wilder, *Frag. Gard.* 113 & 385. 1974; Kooiman, *Act. Bot. Néerl.* 24: 464. 1975; Mold., *Phytologia* 31: 390 (1975) and 34: 272. 1976; Cleene & DeLey, *Bot. Rev.* 42: 452. 1976; Speta, *Candollea* 32: 146 & 155. 1977; Hsiao, *Fl. Taiwan* 4: 418—420, pl. 1057. 1978; Layzell & Horton, *Canad. Journ. Bot.* 56: 1844—1851, fig. 1—14. 1978; Lord, *Shrubs Trees Austral. Gard.*, ed. 5, 254. 1978; A. Löve, *Taxon* 27: 385. 1978; Layzell & Horton, *Biol. Abstr.* 67: 1151. 1979; Hsiao, *Fl. Taiwan* 6: 121. 1980; Mold., *Phytol. Mem.* 2: 277, 281—283, 299, 300, 304, 346, 379, & 529. 1980; Brenan, *Ind. Kew. Suppl.* 16: 58. 1981; Hu, *Enum. Chin. Mat. Med.* 182 & 218. 1981; Munz & Slauson, *Ind. Illust. Living Things Outside N. Am.* 260 & 328. 1981; Mold., *Phytologia* 52: 114. 1982; Weber & Wittmann, *Phytologia* 51: 379. 1982; Bartholomew & al., *Journ. Arnold Arb.* 64: 82. 1983; Mold., *Phytologia* 52: 428—430 & 432—435. 1983.

Illustrations: Houtt., Lin. Pfl. Syst. 2 (7): pl. 56, fig. 2. 1777; Houtt., Natuurl. Hist. 2 (9): pl. 56, fig. 2. 1778; Lindl., Edwards Bot. Reg. 32 [ser. 2, 19]: pl. 2 (in color). 1846; Ōtsuma, Somoku Dzusetsu, ed. 1, 11: pl. 11. 1875; W. Robinson, Garden 24: 523. 1883; Anon., Gard. Chron., ser. 2, 21: 149, fig. 30. 1884; Hook. f., Curtis Bot. Mag. 111 [ser. 3, 41]: pl. 6799 (in color). 1885; Olivier, Handelsb. Tuinb. Sempervirens 14: 220. 1885; Dippe, Handb. Laubholz. 1: 59, fig. 24. 1889; André, Rév. Hort. 64: 324/325 (in color). 1892; Bernard, Rév. Hort. Belg. 19: 272/273. 1893; Koehne, Dendrol. 527. 1893; Ville, Bull. Soc. Tosc.ortic. 21 [ser. 3, 1]: 221, fig. 13. 1896; Linden, Semaine Hort. 2: 89, fig. 229. 1898; L. H. Bailey, Cycl. Am. Hort. 255, fig. 379. 1900; C. K. Schneid., Dendrol. Winterst. 201, fig. 122. 1903; Tillier, Rév. Hort. 75: 15--17, fig. 4. 1903; Spooner, Gard. Chron., ser. 3, 42: 409, fig. 171. 1907; Gérôme, Jardin 24: 381, fig. 224. 1910; C. K. Schneid., Illust. Handb. Laubholz. 2: 587, fig. 382 m--o & 386 k--p. 1911; Makino, Somoku Zousetsu, ed. 2, 11: pl. 11. 1912; L. H. Bailey, Stand. Cycl. Hort. 679, fig. 832. 1914; "A. O." in F. W. Harvey, Garden 76: 24. 1912; Cowley, Garden 81: [478]. 1917; Dreer, Gard. Book 80: 184 (1918), 81: 174 (1919), 82: 169 (1920), and 86: 174. 1924; Itô, Icon. Pl. Formosa pl. 349. 1927; Hottes, Book Shrubs, ed. 1, 152 (1928) and ed. 2, 176. 1931; W. Trelease, Wint. Bot., ed. 3, imp. 1, 334. 1931; Tu, Chinese Bot. Dict., abrdgd. ed., 662. 1933; Junell, Symb. Bot. Upsal. 1 (4): 119, fig. 183, & pl. 7, fig. 4. 1934; Bobbink & Atkins, Roses Ornament. Trees Shrubs 52 [recto] (in color). 1935; Dop, Fl. Gén. Indo-Chine 4: fig. 90. 1935; Dreer, Gard. Book [97]: 117 (in color) (1935) and [98]: 5. 1936; Bedevian, Illust. Polyglot. Dict. 150. 1936; Makins, Ident. Trees Shrubs, ed. 1, 46, fig. 34L. 1936; Farrington, N. Y. Herald Trib. July 25, 2: 14. 1937; Terazaki, Nippon Shokubutsu Zufu [Nature-Col. Wild Pl.] fig. 2489. 1938; Makino, Illust. Fl. Nipp. 185, fig. 554. 1940; Hottes, Book Shrubs, ed. 4, 176. 1942; Makins, Ident. Trees Shrubs, ed. 2, 46, fig. 34L. 1948; Hottes, Book Shrubs, ed. 5, 176. 1950; Metcalfe & Chalk, Anat. Dicot. [1034], fig. 247E. 1950; Kelly Bros., 1951 Gard. Book 44 (in color). 1951; Hottes, Book Shrubs, [ed. 6, imp. 1], 176. 1952; Wayside Gard., Horticulture 31: 175 (in color). 1953; Bean in Chittenden, Roy. Hort. Soc. Gard. Dict. 1: 405. 1956; Boerner in Maatsch, Pareys Illust. Gartenbaulex. 1: 205. 1956; Hottes, Book Shrubs, [ed. 6, imp. 2], 176 (1958) and [ed. 6, imp. 3], 176. 1959; Nair & Rehman, Bull. Nat. Bot. Gard. Lucknow 76: 19, fig. 25. 1962; J. D. Wils & Hedden, U. S. Dept. Agr. Bur. Pl. Ind. Pl. Disease Reporter 46 (3): 187 & 189, fig. 1--3. 1962; Bush-Brown, Shrubs Trees Home Landsc. [78], fig. 23. 1963; Li, Woody Fl. Taiwan 825, fig. 331. 1963; Yotaro, Gard. Pl. World 2: 49, pl. 25, fig. 2 (in color). 1964; R. E. & C. R. Harrison, Trees Shrubs pl. 127 (in color). 1965; N. Taylor, Guide Gard. Shrubs Trees opp. 342, fig. 8 (in color). 1965; Jaitly, Guignard, & Mestre, Comp. Rend. Acad. Sci. Paris D.267: 60, pl. 1, fig. 1--4. 1968; D. R. W. Alexander, Hong Kong Shrubs 21 (in color). 1971; Anon., U. S. Dept. Agr. Pl. Sci. Res. Div. Home Gard. Bull. 181: 2. 1972; Huang, Pollen Fl. Taiwan pl. 162, fig.

4—6. 1972; Huxley, Hardwicke, & Toogood, *Decid. Gard. Trees* 30 (in color). 1973; Hersey, *Flow. Shrubs Small Trees* fig. 109 (in color). 1974; Hsiao, *Fl. Taiwan* 4: 419, pl. 1057. 1978; Layzell & Horton, *Canad. Journ. Bot.* 56: 1947—1950, fig. 1—14. 1978.

A small, ornamental, low-growing, rather tender, sun-loving, densely compact, rounded, autumn-flowering bush or subshrub, or woody perennial herb, wide-spreading, erect, cinereous-pubescent with short, incurved, simple hairs, 0.5—1.5 m. tall, rarely to 2.5 m. tall, usually only to 1 m. or less, aromatic and malodorous; stems herbaceous but woody at or toward the base, mostly erect, simple or branched, obsoletely tetragonal or subterete, usually leafless toward the base and sometimes basally decumbent, covered with close, whitish or grayish, felt-like pubescence; branchlets terete, usually erect or ascending, grayish-tomentose or densely white-pubescent; twigs slender, round in cross-section or very obtusely tetragonal; pith relatively large, rounded, white, continuous; buds small, superposed, the upper often developing in the first season, rounded-conic, with 1 or 2 pairs of indistinct canescent bud-scales; leaves decussate-opposite (or sometimes alternate by the suppression of one of a pair), short-petiolate, very variable, deciduous, exstipulate, pleasantly fragrant with a turpentine odor, the upper ones considerably smaller; leaf-scars broadly crescent-shaped; stipule-scars absent; petioles slender, 4—21 mm. long, whitish-pubescent; leaf-blades firm, glandulose, often silvery-green in general aspect, ovate or narrowly ovate to ovate-oblong, oblong-lanceolate, or ovate-elliptic, 2—8 cm. long, 1.2—3 cm. wide, apically obtuse or obtusish to subacute or acute or even acutely acuminate, marginally serrate or coarsely serrate to incised-serrate (rather regularly so), rarely only finely serrate or even entire, basally obtuse or rounded to cuneate or broadly cuneate, dull-green and slightly pubescent above, lighter green and densely grayish-pubescent or grayish-tomentose beneath with a close, gray, felt-like tomentum and dotted with minute, yellow, translucent glands, the teeth 3—8 per side, coarse and apically acute or obtuse; secondaries prominent on both surfaces but especially so beneath, about 5 per side, not black, the larger ones to 2.5 cm. long; inflorescence mostly axillary, in all the upper leaf-axils, rarely also terminal or subterminal, cymose-paniculate, pedunculate, showy; peduncles about 2 mm. long or sometimes equaling or slightly longer than the upper subtending petioles, covered with a close, gray, felt-like tomentum like the lower leaf-surfaces; cymes densely many-flowered, broadly subglobose or rounded-corymbose, in opposite pairs, trifid, fastigiate, white-velutinous throughout; pedicels capillary, very short; flowers about 4 mm. long, aromatic or odorless; calyx tubular or campanulate, minute or 2—3 mm. long, green, deeply 5-lobed or -cleft to the middle, the lobes lanceolate or linear-oblong, equal or subequal, apically acute; corolla deep-blue or lavender-blue to violet-blue, bright-violet, bright-blue, or blue-purple, 2-lipped, externally downy-pubescent, 5-lobed or sometimes only 4-fid, 6—10 mm. long, the short tube cylindric, apically ampliate, equaling or longer than the calyx, the

limb 8 mm. wide, the 4 upper or posterior lobes shortly ovate or rounded-ovate (lingulate), equal, spreading, apically obtuse or apiculate, the fifth (lower) or anterior lobe larger, concave, lip-like, about twice as large as the others, deflexed, marginally fimbriate or incised-laciniate, the fringes or laciniations mostly 7 and basally deltoid; stamens four, 2—3 times as long as the corolla-tube; filaments slender or even filiform, strict, divergent or erect, 2 longer than the other 2 or all subequal, basally barbate, apically subulate; anthers minute, subrotund or ovate, basally cordate, the 2 thecae apically parallel; pistil shorter than the stamens, composed of 2 or often 3 carpels, the third one (when present) rolled up between the other two; style filiform, glabrous, exerted but not surpassing the stamens; stigma bifid, the branches subulate; ovary globose or subrotund, 4-sulcate, externally pilose to glabrate; fruiting-calyx somewhat enlarged and spreading, 5—6 mm. long; fruit capsular, globose, about 2 mm. long and wide, 4-valved, winged, externally pilose or glabrous, the valves each folding around a seed and falling away with it; seeds 4, subrotund, naked.

Thunberg's original (1778) description of his Nepeta incana, on which this taxon is based, as reported by Willdenow (1804) for his so-called N. japonica, is: "N. florum paniculis axillaribus, foliis petiolatis ovatis serratis tomentosis....Habitat in summis montibus magnae Kosido Japoniae. 4. Caulis herbaceus inferne teretiusculus decumbens nudus, superne obsolete tetragonus erectus tomentosus indivisus spithameus vel paullo ultra. Folia opposita petiolata ovata acuta serrata utrinque tomentosa, sed subtus magis albida patentia, semipollicaria, superioribus sensim minoribus. Petiolo tomentosi lineam longi. Flores paniculati. Paniculae in supremis foliorum axillis oppositae trifidae fastigiatæ. Pedunculus lineam longus pedicellis capillaribus. Stamina flore duplo longiora. Differt a N. Nepetella: floribus paniculatis, paniculis axillaribus, foliis ovate-oblongis, nec cordatis."

The original description of Miquel's Caryopteris ovata (1861) is: "Frutescens? ramulis subtetragono-teretibus petiolis foliisque subtus appresse dense albido-pubescentibus; folia ovata acuta vel breviter acute acuminata, medio utrinque 2—1 raro 4 serraturis, passim integerrima firma, glandulosa, supra pubera, venis utrinque circiter 5 basi approximatis, (majore 1 poll. longa); cymae corymbosae densiflorae albido-velutinae pedunculatae (pedunculo petiolum parum exsuperante); calyx subaequaliter 5-fidus; corolla praeter tubi basin calyce inclusam albido-velutina, lobis quatuor obovatis obtusis, medio fimbriato-lacero, staminibus exsertis. — Croft en abondance sur les montagnes près de Fukwing, rencontrée en fleurs pendant l'automne."

Collectors have found C. incana growing on exposed sea-cliffs, hot loess banks, exposed gravelly riverbanks, slopes and loess slopes, hillsides and mountainsides, exposed rocks and open dry sandy places, rocky grassland, open exposed slopes, low dry hills adjoining beaches, along roadsides, streams, and paths on grassy hillsides, among short grasses, on rock outcrops in exposed dry

areas, on stony riverbeds, in dry clayey soil of open sunny places, open grasslands, cultivated land, and dry places in general, at 100—3300 m. altitude, in flower in April and from July to January, in fruit from August to December, as well as in March. Tsang reports it "fairly common in dry silty meadows" in Kwangtung, China, while in Chekiang it is said to be "common in exposed rocky situations", in Kwangsi "common along open roadsides", in Kansu "common on exposed gravelly riversides", while in Kwangtung other collectors report it as "scattered shrubs in sandy soil of dry level land".

The corollas are said to have been "blue" on Bodinier 487, Cheo 1840 [346], Corbett & Lighty K.462 & 463, Ohashi & al. 137, Rock 13208, Schneider s.n., and Walther 460 and are also so described by Giraud (1966) and Lord (1978), as "mauve-blue" on Sykes 282/65, as "blue or purple" on Fang 1502, as "bluish-purple" on Ching 4677 & 7745 and Sun 1042, as "lavender-blue" on 1980 Sino-Amer. Exped. 1656 and MB. 23-44, as "lavender" on Rock 12709 & 12755, as "bluish-white to pale-lavender" on McClure 618 & 7445, "lavender" on McClintock s.n., Rock 12765, and Stearn s.n., "light-purple" on Chung 1387, "purple" on Ching 1387 & 3591, Sun 822, and Tanaka 288, "deep-purple" on Ching 564, "purplish" on Ching 3847 and Tsiang 10672, "dull-purple" on Ching 564 (some sheets), "blue and pink (2 forms)" on Green s.n. [the pink form is f. superba (Dreer) Mold., which see hereinafter], "one segment fringed and RH Veronica Violet 639, the other lighter" on Peele 336, and "green" on Tsang 21714 [surely an error in observation or transcription!]. On Tak & Chow 3020 the fruit is described as having been "yellow".

Hance (1873) asserts that the entire plant has the scent of the wood used to make "lead" pencils, Sabina virginiana.

Common and vernacular names reported for Caryopteris incana include "abu dhaqn zaigah", "Blaubart", "blue-beard", "bluebeard", "blue spiraea", "blue spirea", "bush verbena", "cariopteride", "caryoptère", "cariopteris à fleurs barbue", "chau ma tin fung", "Chinese beardwort", "chinesische Bartblume", "chinesische Blaubart", "common bluebeard", "dan giku", "dan-giku", "dangiku", "feng eul sao", "graufilzige Bartblume", "japanische Katzenmünze", "ma hao", "mari sakal", "mistache-plant", "ran gikou", "ran giku", "sat song kim", "verbena shrub", and "yu (lan-hsiang-ts'ao)". In Materia Medica it is known as "Herba Caryopteridis". Bedevian (1936) lists its Arabic name in Arabic cheirography.

The type material of Caryopteris mastacanthus Schau. — the name under which this species used to be almost universally known — was collected by Fortune "near Canton, Chusan, and Koo-ling (or Koo-lung-soo)" in northern China in 1844 or 1845 [or "1846", according to Coates (1969)] and introduced into cultivation in England the same year, where it was treated as a greenhouse subject and eventually discarded when its novelty there wore off, so that it became "apparently lost" from cultivation and had to be re-introduced by Messrs. Veitch through their collector, Charles Ma-

ries, who found it growing "in fields, rocky places, and on mountains" in Japan. Veitch advertised it as an "appropriate subject for the herbaceous border, and telling combinations may be made by associating with it white or yellow flowered border Chrysanthemums."

Hooker (1885) records the species also from Hong Kong and Fuchow and asserts that "it is common in southern Japan". His accompanying plate was made from a plant growing against a wall at Kew in October of 1884. Presumably this approximates the date of its second introduction. Hooker & Arnott (1836) cite a Millett collection from Canton and a Vachell collection from Macau, both unnumbered.

Lindley (1846) notes that the classification of Caryopteris in the Verbenaceae is somewhat doubtful: "Certainly it [the present species] exhibits some peculiarities of structure which justify the doubts that have been entertained about it; for its ovary is distinctly one-celled, with two double placentae turning aside, and bearing single ovules hanging down from their upper part. That is to say, the two carpels, of which the ovary of a Verbena is usually composed, instead of uniting in the middle and so dividing its cavity into two or more cells, are not able to touch. The specimens which were produced in the garden of the Horticultural Society were in many instances in an anomalous condition. Some of them had three carpels and six ovules; others had an imperfect carpel rolled up between the other two regular ones, and occupying the very axis of the flower."

Maximowicz's original (1882) description of his C. tangutica -- often regarded, even now, as a distinct species and perhaps worthy of varietal designation -- is: "Affinis C. mongolicae Bge. et C. incana Miq., priori proxima. C. mongolica differt enim tantum foliis lineari-oblongis utrinque acuminatis, respectu laminae brevi-petiolatis, margine integerrimo v. parce serrato, cymis laxis 3--7-floris, flore triente majore, fimbriis labii bitrifidis. C. incana magis distat caule suffruticoso, foliis ovatis basi rotundatis v. subcordatis grandiserratis, cymis multifloris, sed fimbriae labii pariter indivisae. Frutex 1 1/2 -- 5-pedalis habitu C. mongolicae, corolla pallida rosea v. coerulea. Kansu occid. - Przewalski, 1880."

Handel-Mazzetti's C. tangutica var. brachyodonta is based on H. Smith 4806 from a sunny hillside at Hsu-tsing, at 2100 m. altitude, in Szechuan, China, and was described by him as "Folia ovata, 9--25 mm longa, longitudine c. duplo angustiora, apice lato acutiuscula, basi rotundato-truncata, margine leviter tantum crenato-serrata, dentibus ad 1/3 vel 1/4 utriusque lateris tantum penetrantibus; nervi utriusque 6--8, sub 40--45° ascendentes, infimi saepe sub angulo rectiusculo abeuntes." For what he regarded as typical C. tangutica he cites Liljestrand 58 and Smith 2260 & 4519 from Szechuan, while as typical C. incana he cites Ching 3591 & 3847 from Chekiang.

Bean (1922) gives us this history and description of C. tangu-

tica — a taxon accepted as valid by, among many others, Bean (1970), Rehder (1927), Stucchi (1968), and Spooner (1907). It was introduced into cultivation by Reginald Farrer about 1915 from western Kansu, China, where the climate is apparently colder, resulting in the species being hardier than its relatives. It had first been discovered by the Russian traveler, Przewalsky, and is described as a bushy shrub, 3--5 feet tall, with semi-woody young stems, a close gray indument on the lower leaf-surfaces, peduncles, and pedicels, the leaves opposite, oval, $3/4$ -- $1\ 1/2$ inches long, with usually 4 coarse rounded teeth on each side, the flowers borne in both axillary and terminal corymbs, each 1 to $1\ 1/2$ inches wide, the calyx basally campanulate, with 5 lanceolate violet-tipped lobes, and the corolla $1/2$ inch long, bright blue-violet, with 4 short lobes and 1 long fringed one. It is obviously closely allied to C. incana (Thunb.) Miq., but is said to differ from this in its more deeply divided lower corolla-lip and the coarsely toothed leaves. In the Kew gardens it has bloomed in September.

Cave (1964) reports for C. incana the diploid chromosome number as 40 and 52. Bolkhovskikh (1969) also lists 40 and 52, based on the findings of Sharma & Mukhopadhyay (1963). Löve (1978), however, reports the chromosome count as $2n = 26$, based on "MP & IC 217" from cultivated plants in Bulgaria.

Jaitly and his associates (1968) affirms that "L'embryon du C. Mastacanthus se developpe conformément aux lois déjà reconnues chez le Verbena officinalis, ce qui confirme l'homogénéité de la famille des Verbenacées et ses rapports étroits avec celle des Labiées."

Junell (1934) discusses the gynoecium morphology on the basis of Ching 3591 and H. Smith L.58 in the Uppsala herbarium and from live material at Cambridge University. He also quotes the above-cited Lindley observation about gynoecium abnormalities and adds "Die letztere Abnormalität entspricht offenbar der, welche ich oben bei Lippia nodiflora....beschrieben habe."

Gibbs (1974) found syringin absent from the leaves. Spetz (1977) comments that "Diese Art hat Korollenhaare wie Veronica; sämtliche Zellkerne in der Korolla sind mit grosslamelligen Eiweisskörpern angefüllt."

Nair & Rehman (1962) describes the pollen as "3-zonicolporate, subprolate (56×44 μ ; range 53 — 60×42 — 46 μ). Colpi ends rounded, tenuimarginate, membrane crustate. Apocolpium diameter 7 μ . Exine 2.3 μ thick. Ectine almost as thick as the endine, granulate (granules thick as that in the pollen of some species of Clerodendrum). In another of their 1962 works the same authors describe the pollen as "Subprolate (54×42 μ ; range 53 — 60×39 — 46 μ). Apocolpium diameter 10.5 μ . Exine surface reticulate." Huang (1972) describes the grains as "3-colpate; prolate to spheroidal; 21 — 28×18 — 22 μ ; amb circular or circular-lobate; colpi 19 — 23×3 μ ; exine 1.5 μ thick; tectum with scabrate processes; sexine finely reticulate, with Q-pattern", on the basis

of Huang 4292. Erdtman (1945), on the basis of H. Smith 12238 and Tsushima s.n., describes the pollen as subprolate, tricolpate, and provided with a faint reticulation apparently identical to that seen in C. tangutica.

Tamm (1965), as well as Cleene & DeLey (1976), report C. incana susceptible to attack by crown-gall, Agrobacterium tumefaciens. Schmelzer & Schmidt (1968) found it subject to infestation by the tomato black-ring virus and alfalfa mosaic, producing white- and yellow-spotted leaves, a condition sometimes known as lucerne mosaic. Schmelzer (1970) found its derived hybrid, C. Xclandonensis Simmonds, susceptible to cucumber mosaic virus. Harlan & Jenkins (1967) report root-knot nodules formed on C. incana by a nematode, Meloidogyne hapla, a condition which may be controlled by use of Cynem at the rate of 750--1150 ppm on bare-rooted plants. Wilson & Hedden (1962) also report the same nematode depredations and found that if no nematocide treatments were applied the winter survival rate was only about 9 percent, while if such nematocides were used the survival rate rose to 50--90 percent. Gibbs (1974) reports the HCl/methanol test as negative.

Dunn & Tutchter (1912) record Caryopteris incana from ravines in Hong Kong, referring to its corolla-color as "pale-lavender" in October, while Alexander (1971) tells us that it grows in such ravines both in Hong Kong proper and its New Territories. Zander, giving its natural distribution as eastern China and Japan, asserts that it may grow to 2.5 m. tall, the corollas "dark violet-blue", flowering in Germany in September and October, "daher als Spätblüher für warme Lagen wertvoll [als] Bodendecke, friert oft zurück". Hara (1959) lists it from Okinawa island. Encke (1960) gives its natural distribution as Japan, Taiwan, and China.

Dreer, in 1918, in the U.S.A., was selling plants of C. incana at 20 cents each, \$2 per dozen, and \$12 per hundred. In 1919 the price rose to 25 cents - \$2.50 - \$15.00; by 1934 it was 30 cents - \$3.00 - \$22.50, and in 1935 it was 35 cents - \$3.50 - \$25.00. In 1950 Peter Henderson was offering it at \$1 each for "strong 2-year plants, 12 to 15 inches high" and \$15 a dozen. In 1959 Nut Tree Nurseries was offering it at \$2.75 for a 2--3-foot plant, asserting that the sprays would last 2--3 weeks when cut for bouquets. Bailey (1935) lists C. incana as offered by 15 nursery stock and seed dealers, "C. Mastacanthus" by two, and "C. tangutica" by eleven. Mattoon (1958) lists 17 horticultural sources. There are cultivated specimens preserved in the Kew herbarium.

Everett (1966) recommends it for growth in the Pacific Northwest of the U.S.A. Weber & Wittman (1982) report it as accidentally introduced and naturalized as a volunteer among evergreen shrubby plantings at Boulder, Colorado, based on M. Lane 2956.

Chung refers to the species as a "common herb 1/3 - 1 m. tall" in Fukien, China; McClintock also refers to it as a "herbaceous perennial". Chung found it to be "rare" in the Chinese provinces of Anhwei and Chekiang. P'ei (1947) records it from Sikiang.

Rock 13208 represents the normal broad-leaved form of the species which is said to be "common in [the] Tao and Yellow river valleys" of Kansu, China. Rehder & Wilson (1928) also cite Rock 12765 from Kansu and an even earlier collection by William Purdom in the Laochow district. Herb. Mus. Bot. Stockh. s.n. [12/9/12] exhibits extraordinarily large leaves. Baker & Baker s.n. [Foochow, Dec. 1, 1914], Farrer & Purdom 350 & 657, and Merrill 9862 all have small leaves and apparently well represent the tangutica form of the species. Ching 564 has the leaves unusually narrow and, indeed, looks as though it may well represent a distinct taxon.

Robinson (1883) reports that C. incana grows well in cultivation on the Isle of Wight where "it is most delightful in the autumn; in fact, it looks like a bit of May imported into October. It is covered all over with light blue flowers, and they are slightly fragrant. It.....[grows] very easily on a north wall... [and]....is quite an ornament of the greenhouse.....covered all over with bloom.....The young growths have a sage-like fragrance."

Hooker (1885), speaking of it in England, notes that "Though introduced upwards of forty year ago (by Messrs. Veitch), and so well worthy of cultivation, this beautiful plant has been unknown in our gardens for many years, having been chasséed from the greenhouse in favour of more gaudy things. Lindley....advises its being kept in a greenhouse, watered abundantly, and syringed over head twice a day in summer, but that in consequence of the autumn flowering, the syringing should be discontinued as soon as the flower-buds are formed, otherwise these will be liable to 'damp off'. In winter very little watering is required nor is fire heat required, except to keep off frost." He goes on to say that while it may overwinter in England with protection, it is better regarded there as a greenhouse plant.

André (1892) says that "Le C. Mastacanthus forme un arbuste qui atteint 1m50 de haut environ chez nous, mais pourrait s'élever un peu plus", but most writers give its height as considerably less than 1 meter; in fact, some refer to it as prostrate [probably f. nana (Dreer) Mold.]. André goes on to say that "Sa culture sera facile; tout bonne terre de jardin lui conviendra, pourvu qu'elle ne soit pas trop calcaire. Dans ce cas, il vaudrait mieux employer la terre de bruyère. On obtendra une meilleure floraison en mettant la plante en plein soleil. La multiplication se fera par boutures herbacées, sous châssis froid, ou par tronçons de rameaux secs, plantés avant le prin temps."

Legros (1895) tells us that in France "Le Caryopteris Mastacanthus, lui, a résisté à des gélées de 5 à 15 degrés qui ont duré à peu près six semaines consécutives, du 26 janvier au 8 mars. Il est juste d'ajouter que le terrain où il se trouvait depuis deux ans était très-sain, plutôt léger que fort, et que l'exposition du midi lui était favorable. Ce dernier détail est utile à connaître, car si l'on peut placer l'arbuste dans des conditions analogues de terrain et d'exposition, il n'y aura pas à hésiter à l'adopter

comme parfaitement rustique et un même temps comme un des plus précieux ornements de nos jardins."

Bernaud (1893) says of its hardiness: "charmant arbuste rustique dans le centre de la France, mais résistant mal aux hivers rigoureux de notre pays. On le cultive en Belgique comme plante d'orangerie. Sa résistance au froid nous est attestée par ce fait qu'à Paris, au bois de Boulogne, il a supporté l'an dernier -18° C." He continues: "Mis en pleine terre au mois de mai, les Caryopteris forment de jolie buissons grâce à élégance du port de l'arbuste et au ton cendré du feuillage. Aux mois d'août-septembre, apparaissent autour de chaque aisselle un épi de fleurs d'une couleur bleue; l'apparition de celles-ci ne cesse qu'aux galées, surtout si on a soin de mettre le massif dans un endroit fort ensoleillé. La culture de la plante est fort facile. Comme terre, toute terre de jardin non calcaire, la terre bruyère surtout, lui convient. On multiplie la plante de boutures faites au printemps sous châssis froid."

Cowley (1917) avers that in Scotland it blooms too late in the year "to be of any value in the open" and that it must there be grown in a cool greenhouse where "it succeeds capitally and makes a really handsome and attractive subject...The inflorescence somewhat resembles in form some of the dense flowering Spiraeas, such as S. Douglasii" — hence one of its popular names. He recommends cultural treatment like that given to Hydrangea paniculata: "hard pruning in early spring, abundance of water, and full exposure to sunlight".

Harrington (1937) states that "The so-called blue spiraea is a charming shrub for late summer. It is not hardy enough to thrive around Boston [U.S.A.], but it gives a good account of itself at Newport and at other places along the New England coast, as well as farther south. In cold sections it may flourish fairly well if it is cut back to the ground each fall and well mulched with manure. The new shoots coming up in the spring will usually grow fast enough to bloom in the fall." Harvey (1938) adds that it "Can be massed in base or border plantings in Georgia, but, like lantana, must be cut back to the ground in the upper Piedmont section of the state." Walker (1941) cites, as C. tangutica, Sau 564 from exposed riverbanks in Kansu, China, with "deep purple aromatic flowers", adding that the plant is "common" in this habitat.

Kelly (1951) claims that C. incana is "one of the best low-growing, fall-blooming shrubs. It makes a neat, compact, rounded bush about 2 feet tall, with narrow, silvery green foliage. From August to frost, it is covered with the many clusters of dainty blue flowers. The roots are hardy, but like a Peony bush, you cut off, each spring, the old canes and new ones come up. You are sure to like this shrub." At the time it was selling at 90 cents (U.S.A) a plant or 3 for \$2.25.

Bean (1956) still maintained C. tangutica as a distinct species and separated it from its closest relatives as follows:

1. Leaves narrowly ovate or lanceolate.

2. Leaves 2 — 3 1/2 inches long, toothed or entire; flowers light

- blue.....C. Xclandonensis.
 2a. Leaves 1—3 inches long, coarsely toothed; flowers
 violet-blue.....C. incana.
 1a. Leaves ovate, $3/4$ — $1\ 1/4$ inches long; flowers in close ax-
 illary & terminal clusters.....C. tangutica.

He regarded C. tangutica as the "Hardiest species", asserting that it was introduced into cultivation from Kansu, north China, by Farrer in 1915, under his collection number 305. However, in his revised 1970 work he reduces C. tangutica to synonymy under C. incana, as I do, but asserts that the Farrer material differs from typical C. incana in its "smaller leaves" and "the [lower] lip of the corolla less divided". He also still maintains that the C. tangutica material is hardier and earlier to flower than typical C. incana. This, together with the ovary-surface character mentioned by P'ei (1932), makes it seem probable to me that a distinct variety or form status may be indicated here.

Bush-Brown (1963) tells us that "Caryopteris is a remarkable plant. In the North [of the U.S.A.] it comes up each spring from the roots like a herbaceous perennial. Through the season it grows and broadens to a plant 3 feet high and $3\ 1/2$ wide, very dense, and full of leaves. In late August or September it bursts forth in masses of violet-blue flowers which last for 6 weeks or more. By December it has returned all its vitality to the roots. In the regions of the North, such as northern New England, where a deep covering of snow lasts through the winter, Caryopteris is hardy." It should be planted in rich but well-drained soil in sunshine in the flower border, as part of a foundation planting, or as a late-season flowering hedge. In the North both live and dead branches should be pruned back to just above the soil level in early spring, but in the South only the dead branches need to be removed. Hoag (1965) asserts that in the northern U.S.A. it is definitely less hardy than C. Xclandonensis Simmonds. Lord (1964) avers that it is suitable in Australia only "for mild districts".

Bose (1965) claims that in India C. incana, "blue"-flowered, is very hardy, blossoms in the winter and spring, is propagated by "tip-cuttings", is valued in gardens because there, too, "blues and violets are not common in perennial plants", and there should be pruned during the early rainy period. Garibaldi (1965) reviews the various studies on what growth substances are best for starting cuttings of this plant.

Bush-Brown, in his 1965 work, repeats his assertion that in typical C. incana the corollas are violet-blue in color, adding that in northern areas the plant usually grows to only 3 feet tall, but that it may attain to a greater height in southern climes. Taylor (1965) describes it simply as a "late flowering shrub with a profusion of blue fringed flowers in showy clusters, hardy in Zone 5; in the north it must be mulched and will winterkill but comes up in the spring. The 'Blue Mist' variety is finer than the typical plant and does well in a variety of soils, preferably in full sun." This variety, however, is a cultivar of C. Xclandonensis.

sis Simmonds, which see (above).

Lawrence (1967) asserts that in the southern U.S.A. C. incana starts blossoming September 1—9 and ends blossoming about September 30.

Pal & Krishnamurthi (1967) assert that "The flowers may be of different shades of blue, pink or white [in India], depending on the variety. Whatever the colour, the great wealth of flowers arranged so neatly overwhelms the onlooker by their sheer mass effect."

Cathey (1968) refers to C. incana as a "short day" plant and asserts that daily application of abscisic acid (ABA), in field experiments, did not affect the flowering in any way.

Bean (1970) notes that, as we have mentioned before, after its original introduction into England by Fortune in 1844, C. incana "was at first treated as a greenhouse plant, and being scarcely worth its room there, was eventually lost until re-introduced by Maries in 1880. It is hardy at Kew in all but the hardest winters, and during a fine autumn makes a very pretty display. The leaves are pleasantly scented. It is increased with the greatest of ease by means of soft cuttings in heat, and should be grown in an open, sandy soil, and given a sunny, sheltered position."

Bailey (1972) agrees that C. incana is "A pleasing plant that occasionally grows to 5 ft., but is generally less than 2 ft. [tall]. In colder areas it must be cut back to the ground each spring....It makes a useful ground cover or for massed effect in a large border." The Queens Botanic Garden Society (1972) recommends it for use in seaside gardens. The L. E. Smith s.n., cited below, was taken from material cultivated in Buffalo, New York, grown from seeds imported from France.

A letter to me from the late Dr. Edgar Anderson, dated October 19, 1936, says, in part: "I am writing you concerning the confusion in Caryopteris incana. There are now in cultivation in this country two different things under that name. One has tomentum under its leaves, a calyx which does not enlarge greatly in fruit, and flowers of dark blue. The other is larger and lustier but more herbaceous, the leaves are almost deltoid, are greenish though somewhat pubescent beneath, the flower may be dark blue, light blue, pink (!), or white, the calyx enlarges, etc., etc. A review of the literature and a glance at herbarium specimens shows that both have been confused for a very long time."

In a letter of April 27, 1938, he says, in part: "I have finally had to deny myself the pleasure of playing with the problem of Caryopteris. Some day soon I shall write a short popular account of the confusion for our bulletin and let it go at that. It is, I think, a perfect example of the need and horticultural importance of taxonomic work."

Franchet & Savatier (1875) cite as Caryopteris incana, Buerger s.n., Savatier 913, Siebold s.n., and Thunberg s.n. from Japan. They also cite "So mokou Zousetz, vol. 11, fol. 12, sub Dan gikou; Ran gi Kou" as an illustration in literature, but this has not yet

been definitely verified by me.

Maximowicz (1886) cites unnumbered collections of Augustinowicz, Forbes, Fortune, Millett, Miquel, Oldham, Shearer, Tanaka, and Vachell from Japan and notes that "Ex Hanceo lignum Juniperi virginianae spirat". He cites for what he regarded as C. tangutica only an unnumbered Przewalski collection from Kansu, China, distinguishing it from C. incana as follows:

1. Calyx 5-fid, leaf-blades cordate-ovate or ovate-oblong, coarsely serrate.....C. incana.
- 1a. Calyx only 5-dentate, leaf-blades lanceolate, incised-serrate with a few teeth..... C. tangutica.

As stated above, most modern authorities now regard the two taxa as conspecific.

Forbes & Hemsley (1890) cite for what they call C. mastacanthus Fortune 34 & 136, Millett s.n., and Parker s.n. from China (province undetermined), Maries s.n. from Fukien, Henry s.n. from Hupeh, Playfair s.n. from Kwangtung, Playfair s.n. from Taiwan, and Champion s.n. and Tate s.n. from Hong Kong. For what he calls C. ovata he cites only Krons s.n. from the mountains near Fukwing [=Fukien] in southeastern China, and for what he calls C. tangutica only Przewalski s.n. from the high alpine region of Kiangsu.

Diels (1902) cites Garibaldi 1373, 1374, & 1375 and Rosthorn 2519 from central China. Rehder & Wilson (1928) cite Wilson 12765 & 13208 from Kansu, as well as a Purdom collection from the Lao chow district. P'ei (1932) cites Ching 7745 from Kwangsi, as well as Ching 4677 & s.n. [Sept. 1925] from Anhwei, Ching 3591 and Mac Gregor 1908 from Chekiang, Chang 638 from Fukien, Allison 14 and Steward s.n. [Nov. 1922] from Kiangsi, Tak & Chow 2316 & 3020, To s.n., and Tsiang 1068 & 3257 from Kwangtung, Fang 1502 and Wilson 2221 & 4312 from Yunnan, and Hu 1375 from an undetermined locality in China, as well as Ford s.n. from Hong Kong, Chung 1386 from Amoy island, and Merrill 1387 & 9862 and "ex C. 1229, 1679, & 3472" from Honam island. Of these, however, the Tak & Chow 2316 and Tsiang 1068 & 3257 represent f. candida. As C. tangutica he cites Ching 564, Hers 2434, Purdom 792, and Rock 12709, 12755, & 13208 from Kansu, Henry 2782 and Wilson 2153 from Hupeh, and Rosthorn 2519a and Wilson 2221 from Szechuan. He comments that "This species was described by Maximowicz from Kansu Province, and he distinguished it from other species simply by its incised leaves and simple fimbriation of the lower corolla-lobe. Another important differential character is the glabrous ovary. The related species, C. incana Miq. has very densely pubescent ovary and hirsute capsules. In general appearance it is very much like C. incana Miq., but the two may be distinguished by the character indicated above. Another allied species is C. trichosphaera Sm., from which it differs by the outside of the corolla-lobes being appressed villous." In spite of this apparently careful work by P'ei, it is the opinion

of more recent workers [e.g., Rehder, 1949 & 1949, Encke, 1960, Bean, 1970] that C. incana and C. tangutica are conspecific.

Li (1963) cites Kawakami & Nakahara s.n., Nagasawa 570, Miyake s.n., Sasaki s.n., Suzuki 21426 & s.n., Tashiro s.n., and Wilson 11147 from Taiwan. Hyland (1968) cites Corbett & Lighty K.462 & K.463 [U. S. Pl. Invent. 318522 & 319286] from the seacoast of Korea. Hsiao (1978) cites from Taiwan: Nagasawa 570, Sasaki s.n., Suzuki 21426 & s.n., and Wilson 11147, giving the overall distribution of the species as China, Korea, Japan, and eastern Taiwan.

It may be worth mentioning here that Jackson (1893), as well as Grubov & al. (1970), cite the Maximowicz (1882) reference in the specific bibliography (above) as "1881" (the titlepage date), but Stafleu asserts that this was not actually issued until January 21, 1882. Walker (1942) erroneously cites the Mém. Biol. reprint as "Bull. Acad. Sci. St. Petersb. 11: 301. 1881". Rehder, similarly, cites the Mélanges reference as "1881". Rehder (1928) cites the Hooker (1885) reference in Curtis, Bot. Mag., as vol. "CIII" instead of "ser. 3, vol. 41" as is usually done. Stapf (1930) incorrectly cites the Cowley (1917) reference as page "477".

Miquel's original publication of the combination, Caryopteris incana, is mostly cited as published in "1866", but was actually issued between April and December, 1865. Similarly, the name-carrying Nepeta incana of Thunberg is often cited [e.g., by Siebold & Zuccarini (1846), Hooker (1885), Blanchard (1892), Tillier (1903)] as having been published originally by him in Fl. Jap. 244 (1784) — actually, it was first published in Houttuyn's Natuurl. Hist. Pl. in 1778. This latter reference is cited by Li (1963) as "Houtt., Nat. Hist. 9: 307" but it is actually in volume 2, part 9, page 307.

The Forbes & Hemsley (1890) reference is often cited as "1886" or "1887", but actually pages 121—136 of volume 26 were not published until 1890. Maximowicz (1886) erroneously cites the Hance (1873) reference to page "166". Hara (1948) and Hooker (1885) incorrectly date the Walpers (1845) reference as "1844", but pages 1—192 were actually not issued until June 25—28, 1845; Rehder (1949) also erroneously refers to a "p. 2", but the Caryopteris reference is actually on an unnumbered page immediately preceding page 4, and so should be cited as "[3]".

The Hooker & Arnott (1836) reference is often cited as "1841", but pages 193—288 were actually issued already in 1836. The Hsiao (1978) reference is sometimes incorrectly cited as published in "1975". The Li (1963) reference is sometimes erroneously cited as "Li, Fl. Taiwan 17: 944", but the work does not consist of seventeen volumes!

Tillier (1903) mis-cites the Franchet & Savatier (1875) reference as page "257" instead of "357—358". Similarly, the Willdenow (1800) reference is mis-cited by Hooker (1885) and by Tillier (1903) as page "62" instead of page 52. Encke (1960) mis-cites the Hooker (1885) reference as "1844". Some authors [e.g., Pritzl] cite the Siebold & Zuccarini (1846) reference

as "1843", "1845-1846", or even "1847".

The Pullin 336 collection, cited below, does not indicate on its accompanying label that it was taken from cultivated material, but I am assuming that it was.

Material of *C. incana* has been misidentified and distributed in some herbaria as *C. glutinosa* Rehd. and even as *Abelia ionandra* Hayata. On the other hand, the Hu 12249 and Tamm 1782, distributed as typical *C. incana*, actually are *f. candida* (Schneid.) Hara, while Collector undetermined s.n. [20 Sept. 1910] is the type collection of *f. macrophylla* Mold., Chiao 18868, Lau 4785, Levine, Herb. Canton Chr. Coll. 1678 & 3472, Suzuki 21426, and Wilson 11118 are *f. nana* (Dreer) Mold., Wilson 2221 is the type collection of var. *szechuanensis* Mold., Hassib s.n. [5/4/28], s.n. [17/2/1930], & s.n. [29/4/1941] and Mahdi 4 & s.n. [15/1/1964] are *C. odorata* (Hamilt.) B. L. Robinson, Rock 10013 is *C. trichosphaera* W. W. Sm., J. H. Kellogg s.n. [Cult. Mo. Bot. Gard.] (at least, in the Bailey Hortorium herbarium, is *Elscholtzia stauntoni* Benth. in the Lamiaceae, Oh 5 is a mint, and Collector undetermined 224 (in the Utrecht herbarium) is apparently a mixture with a no. 163 which is non-verbenaceous.

Citations: BURMA: Farrer & Purdom 1500 (Mi). CHINA: Anhwei: Ching 4677 [Herb. Univ. Nanking 9063] (Ca—263474, W—1279888); McClure 4034 [Herb. Lingnan Univ. 15384] (Ca—319976). Chekiang: Ching 3591 (Ca—343342), 3847 (Ca—397092). Fukien: Baker & Baker s.n. [Foochow, Dec. 1, 1914] (Gg—30578); Chang 638 (Ca—258542); Chang & En 2767 (Bz—18707), 2862 (Du—200933); Chung 1386 (Ca—225379), 1387 (Ca—225380); En 2767 (Mu), 2862 (Mu); Fortune 136 (S); Ging 5401 (Um—142, Ws), 5552 (Mi), 5611 (Mi), 5659 (Mi), 5874 (Mi), 6836 (Ws), 6866 (Mi); Krons s.n. [Fukwing, Sept.] (S); Maries s.n. [Foo Choo] (Pa); Metcalf, Chen, & Chen 638 (Vi); Tai & Ging 5052 (Gg—154267); Tsoong 304 (Ca—225054). Honan: L. H. Bailey s.n. [Kioshan & vicinity, June 24, 1917] (Ba). Hunan: Dahlström 190 (S); Fan & Li s.n. [9.1935] (Bz—18706). Hupeh: Chen 3092 [Herb. Univ. Nanking 15478] (La); Cheo 18410 [field no. 346] (N); Chung 9189 (N); Sun 761 (N), 822 (N), 1042 (N); E. H. Wilson 2153 (N, W—596943), 2782 (W—800393); 1980 Sino-Amer. Exped. 1656 (N). Kansu: Ching 564 (Ca—283002, W—1245592); Farrer & Purdom 350 (Mi, Mu), 657 (Mi, Mu); Hers 2434 (Br); Purdom 792 (Gg—32001, W—1092838); Rock 12765 (S, W—1331845), 13208 (Ca—381725, N—photo). Kiangsi: Tsiang 10672 (N). Kwangsi: Ching 7745 (W—1508922). Kwangtung: Lau 703 (N); Levine, Herb. Canton Chr. Coll. 1229 (Ka—62926, Ph, W—877416); McClure 618 [Herb. Canton Chr. Coll. 7446] (S), 7445 [Herb. Canton Chr. Coll. 253.7191] (I); Tak & Chow 3020 [Herb. Lingnan Univ. 14881] (Ca—319639); Tsang 21714 (N, S). Sikiang: H. Smith 12238 (S), 13403 (S). Szechuan: Cheng 2007 (Du—336030, N, W—1671704), 3201 (N), 3238 (Du—332809, N, W—1626947).

[to be continued]

A NEW SPECIES OF CRITONIA (ASTERACEAE-EUPATORIEAE) FROM BELIZE

B. L. Turner

Department of Botany, University of Texas, Austin, Texas 78712

In connection with ongoing studies of the Compositae of Central America the following undescribed taxon was noted. I am grateful to M. C. Johnston for the Latin diagnosis and to GH for the loan of material.

Critonia belizeana B. L. Turner, sp. nov.

Critonia lanicaule accedens sed foliis glabris, capitulis floribusque minoribus valde differt.

Herbaceous shrub to 2 m tall. Stems rounded, green, puberulent. Leaves glabrous, except for the major nerves; petioles 0.5-5.0 mm long; blades narrowly oval, coarsely dentate, reticulately-veined, acute at the apex, 6-14 cm long, 3-5 cm wide. Capitulescence terminal, cymose-paniculate, the cymules arising out of leafy bracts. Heads broadly turbinate, 14-15 mm long on ultimate pedicels 35 mm long. Involucre 5-6 seriate, 12-13 mm long; bracts markedly gradate, broadly ovate, the apex obtuse, puberulent to glabrate, the inner series readily deciduous. Receptacle convex, the central portion often "hollowed-out". Corolla tubular, seemingly white, 5.5-6.0 mm long; throat scarcely distinguished from the tube, if at all; lobes 5, ca. 0.5 mm long. Anthers ca. 1.4 mm long, the appendages short, ca. as wide as long. Style appendages linear, relatively smooth. Achenes 3.5-4.0 mm long, 4-5 ribbed, black to brown, hispid above, mostly between the ribs; carpodium 4-5 sided, gradually merging into the ribs; pappus of 50-60 persistent setae, 4-5 mm long.

TYPE: BELIZE. S peak of Saddle Back, ca. 2.5 mi NW of Punta Gorda; 500-600 ft.; clearing on rocky limestone hilltop; 19 Apr 1976, G. R. Proctor 35818 (holotype GH).

The species is readily related to Critonia lanicaule (B. L. Rob.) K. & R. but differs markedly in its glabrate foliage, smaller heads with smaller florets, etc. Critonia lanicaule has been collected from Chiapas to Honduras where it reportedly occurs in rocky places at relatively low elevations. Inclusion of C. belizeana in the Critonia complex of Eupatorium (sensu lat.) follows that of King & Robinson, but additional more inclusive study might show the species to be more closely

related to yet other generic segregates such as Peteravenia K. & R. In fact, C. lanicaulis and C. belizeana are readily placed in the latter group if King and Robinson (1979) hold to the view that Eupatorium cyrili-nelsonii A. Molina belongs to the Peteravenia grouping, a view not accepted by Mr. Randy Scott (pers. comm.) who has studied the latter in considerable detail. In short, much additional study will be needed before the generic lines among these groups can be drawn with certainty.

Literature Cited

King, R. M. and H. Robinson. 1979. Studies in the Eupatorieae CLXXVI. *Phytologia* 44: 84-88.

A NEW SPECIES OF LITHOSPERMUM (BORAGINACEAE) FROM NEAR
EL SALTO, DURANGO, MEXICO

B. L. Turner

Department of Botany, University of Texas, Austin, Texas 78712

Recent collections by Dr. R. D. Worthington in a remote area southwest of El Salto, Durango has revealed the following novelty.

Lithospermum worthingtonii B. L. Turner, sp. nov.

L. calycosum accedens sed calycibus brevioribus, foliis auriculatis pubescentibus, corollis latioribus lobulis corallarum integris, pollinis granis ovoideis.

Perennial herbs 30-45 cm tall. Stems stiffly erect, unbranched below, arising from a persistent rosette. Basal leaves villous, oblanceolate, 3-5 nerved, up to 5 cm long and 1.5 cm wide; stem leaves 20-30, lanceolate to ovate-lanceolate, sessile, somewhat clasping, moderately soft silky-villous above and below, only the mid-nerve obvious. Inflorescence terminal with 1-3 circinnate branches. Calyx (both flowering and fruiting) 4-5 mm long, the lobes 5, linear, 3-4 mm long, pubescent with mostly appressed soft silky hairs. Corolla yellow, broadly tubular, flaring toward the lobes, 9-15 mm long; tubular portion moderately spreading pubescent throughout, the inner surface without faucal appendages, glabrous except for scattered glandular trichomes in the throat and accentuated in lines just below the anther sacs, a few peculiar, much longer, eglandular, multiseptate trichomes often found above the anthers; lobes recurved, 2-4 mm long and twice as wide, entire or nearly so. Anthers 2-3 mm long, attached 2-4 mm below the throat, glabrous, without appendages; free part of filament ca. 0.5 mm long, glabrous. Style 2.5-3.0 mm long, the stigma 2-lobed. Nutlets 4, ovoid, ca. 2 mm long, 1.6 mm wide, prominently crested both ventrally and apically, smooth, glaucous. Pollen globose, 2-porate.

TYPE. MEXICO. Durango: 5.1 road miles along highway 40, southwest of El Salto at Arroyo de Agua (ca. 23°45'N x 105°24'W), ca. 8000 ft, "pine forest, rocky slopes along stream", 20 Aug 1982, R. D. Worthington 8904 (holotype TEX; isotypes ETEP; MEXU).

Lithospermum worthingtonii will key to L. calycosum in Johnston's (1952) treatment of the genus. It is readily

distinguished from that taxon, however, by its consistently shorter fruiting calyx (4-5 mm long vs 9-10 mm long), auriculate or semi-clasping upper stem leaves which are softly pubescent, broader corollas with essentially entire lobes and ovoid pollen grains. Nevertheless, they possess similar corollas (both without faucal appendages and endowed with glandular trichomes within the throat and stamens attached in the upper part of the tube). They also possess similar nutlets, although those of L. worthingtonii appear to be somewhat smaller and with more prominent apical ridges.

It is a pleasure to name the species for Dr. Richard D. Worthington of the Department of Biology, University of Texas, El Paso (ETEP), avid collector and nautralist who forwarded the present material to me for identification.

Literature Cited

Johnston, I. M. 1952. Studies in the Boraginaceae, XXII. A survey of the genus Lithospermum. J. Arnold Arb. 33: 299-315.

TWO NEW SPECIES OF KOANOPHYLLON (ASTERACEAE-EUPATORIEAE)
FROM NORTHEASTERN MEXICO.

B. L. Turner

Department of Botany, University of Texas, Austin, TX 78712

Exploration of the poorly explored eastern slopes of the Sierra Madre Oriental continue to yield a rich assemblage of undescribed taxa. The two species described below are closely related to Koanophyllon longifolia (B. L. Robs.) K. & R. but are readily separable, as noted in the discussion that follows each.

KOANOPHYLLON REYROBINSONII: B. L. Turner, sp. nov.

K. longifolia similans sed laminis foliorum latioribus minus pubescentibus, petiolis perbrevioribus, capitulis confertioribus.

Suffruticose perennial to 1.5 m tall. Stems brittle, evenly pubescent with crisped, multiseptate hairs, these often with purplish cross-walls. Leaves broadly ovate to cordate, irregularly crenate-dentate, 5-15 cm long, 4-10 cm wide, strongly reticulate, the upper surfaces sparsely puberulent but soon glabrate, lower surface glandular-punctate, evenly pubescent with tawny to white, crisp hairs, these persisting on the major veins; petioles 3-10 mm long. Capitulescence terminal, cymose-paniculate, 3-15 cm long, 4-12 cm wide. Ultimate peduncles 2-10 mm long. Heads reportedly "cream", broadly turbinate, 10-15 flowered, 5-6 mm long. Involucre 3.5-4.2 mm long, 2-3 seriate, eximbricate, except for the outer-most 1-3 bractlets; phyllaries 10-14, linear-lanceolate, both puberulous and atomiferous-glandular. Corollas glabrous, tubular, 2.5-3.0 mm long; tube ca. 0.6 mm wide, gradually (rarely abruptly) flaring into an ampliate limb 1.0-1.5 mm wide; lobes acute to obtuse-apiculate, ca. 0.25 mm long, 0.50 mm wide, atomiferous-glandular. Anthers ca. 1.5 mm long, the appendages obtuse, wider than long to somewhat longer than wide. Style branches ca. 6 mm long, the appendages linear-oblancoolate to somewhat abruptly linear-clavate. Achenes ca. 3 mm long, 1 mm wide, 4-5 costate, sparsely hispid; pappus of 40-50 persistent setae, 2-3 mm long.

TYPE. MEXICO: Neuvo Leon. Sierra Madre, Monterrey, 27 May 1908, C. G. Pringle 15596. (Holotype LL; isotype GH).

Additional specimens examined: NUEVO LEON: 6.9 mi W of Linares along highway 58, 23 Oct 1981, Dorr et al. 2041

(TEX); foot of Chipinque, Monterrey, 9 Oct 1937, L. A. Kenoyer s.n. (F); canyon above El Dentro, Monterrey, Oct 1961, R. F. Smith M583 (TEX). TAMAULIPAS: Sierra de Tamaulipas, ca. 40 km NNW of Atadama, Las Yucas, "El Pinosa", in pine-oak forest, without date, R. L. Dressler 2412 (GH).

Koanophyllon reyrobinsonii is an exceedingly variable taxon to judge from the relatively few specimens examined, most of these from near Monterrey. The type has pubescent, light green, somewhat thickish leaves which are densely glandular-atomiferous beneath, while the collection of Dorr et al. possesses large, membranous, dark green, nearly glabrate leaves which are only sparsely glandular-atomiferous. Nevertheless, these several collections are quite similar and together show a variation from population to population that is fairly typical for other species of Asteraceae in the region.

It is a pleasure to name the plant for R. M. King and Harold Robinson whose work has brought to the fore the extraordinary diversity of opinion that exists among synantherologists as to what constitutes a genus in the tribe Eupatorieae. While I do not pretend to know the "wisdom" of describing the present novelty as a member of the resurrected genus Koanophyllon or as a member of Eupatorium as envisioned by the late B. L. Robinson, I have opted for the former simply because experience has shown that this combination will be formulated regardless of "need" (King and Robinson, 1977; *Phytologia* 37: 458.). In the meantime the synantherological community (including myself) might meditate with more care the best way to treat the Koanophyllon complex: as a genus? as an infrageneric category within Eupatorium as envisioned by B. L. Robinson? or perhaps as a subgeneric category within some other, yet earlier, generic group (e.g. Critonia).

KOANOPHYLLON RICHARDSONII: B. L. Turner, sp. nov.

K. tongifolium simulans sed foliis adpresse puberulis, laminis tenuibus ovatis vix reticulatis basibus obtusis, achaeniis saepe glanduloso-pubescentibus vel glabris.

Shrub 1.0-2.5 m tall; appressed-puberulent to glabrate. Leaves 4-15 cm long; blades thin, sparsely reticulate, broadly to narrowly ovate, mostly obtuse at the base (rarely rounded or acute), sparsely appressed puberulent to glabrate, densely and uniformly glandular-punctate; petioles (15) 20-40 mm long. Capitulescence terminal, up to 10 cm long, 15 cm wide. Ultimate peduncles mostly 2-6 mm long. Heads turbinate, reportedly "pink" or "pale pink", 8-15 flowered, 5-6 mm long. Involucre

3-4 mm long, 2-3 seriate, eximbricate; phyllaries 9-11, linear-lanceolate, sparsely minutely puberulent and atomiferous-glandular. Corollas glabrous, ca. 3 mm long; tube ca 1.3 mm long, gradually ampliate into a limb ca 1.2 mm wide; lobes ca. 0.3 mm long, 0.4-0.5 mm wide, sparsely atomiferous-glandular. Anthers ca. 1.5 mm long, the appendages ovate, obtuse, longer than wide. Style branches 6-8 mm long, the appendages linear, 5-6 mm long. Achenes 2-3 mm long, 1 mm wide, 4-5 costate, glandular-pubescent or nearly glabrous (rarely a few isolated hairs near the apex); pappus of 30-50 persistent setae, 2-3 mm long.

TYPE. MEXICO: Tamaulipas. Rancho del Cielo, Gomez Farias, growing along trail, 26 Nov 1968, Alfred Richardson 1014. (Holotype, TEX).

Additional Specimens Examined. SAN LUIS POTOSI: Minas de San Rafael, Nov 1910, Purpus 4808 (F); Pelote, Nov 1910, Purpus 4823 (F). TAMAULIPAS: 50 mi W of Mante, Liquidambar woods, 28 Nov 1946, M. C. Johnston s.n. (TEX); Rancho del Cielo, 26 Nov 1968, Richardson 993 (TEX), 996 (TEX), 997 (WISC), 1068 (TEX), 1080 (WISC), 1081 (TEX); 6.3 mi W of Ciudad Victoria, 22 Dec 1976, Turner P6 (LL); Jaumave, "near San Lucas", Jan 1933, Von Rozynski 651a (F); Rancho del Cielo, Nov 1964, F. & M. Webster 85 (TEX), 117 (TEX); 9.9 rd. mi SW of Ciudad Victoria, 6 Jun 1982, Worthington 8445 (TEX).

Koanophyllon richardsonii, like K. reyrobinsonii, is exceedingly variable, especially in leaf shape. It is readily distinguished from the latter by its exceedingly well-developed petioles, which also exceed those of K. longifolia. It differs from both of these species in its predominately glandular-pubescent to glabrous achenes and thin, scarcely reticulate leaves.

Figure 1 shows the distributional relationships of these several taxa. Koanophyllon longifolia, according to label data, occurs in relatively wet, oak-dominated closed forests on the eastern slopes of the Sierra Madre at 1400-1600 meters. K. reyrobinsonii occurs mostly about Monterrey in pine-oak forests at lower elevations and presumably in drier habitats. K. richardsonii, at least at the type locality, occurs at somewhat higher elevations in drier sites in relatively wet forests. According to data on the Johnston collection (Ciudad Juarez, 50 mi W of Mante) the latter species was found in Liquidambar woods but it also occurs at much lower sites along the canyon bottoms to the west of Ciudad Victoria.

It is a pleasure to name this species for my ex-student, Alfred Richardson, Professor of Biology at Southern-most University, Brownsville, Texas, who has assembled a fine suite of collections from Rancho del Cielo and who first called the plant to my attention.

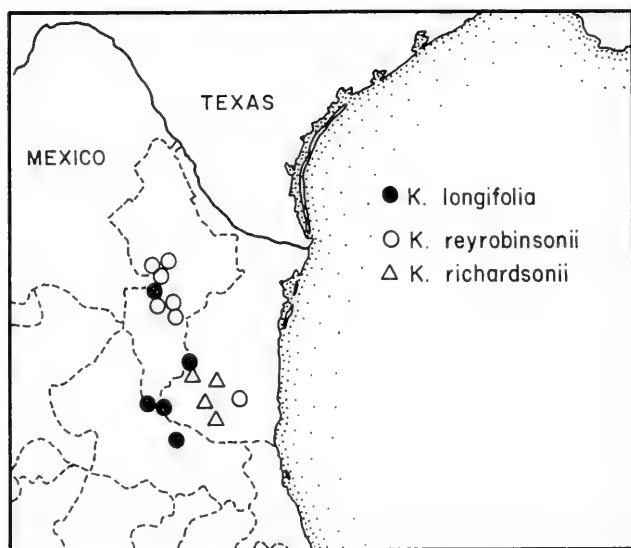


Fig. 1. Distribution of *Koanophyllon* species.

Index to authors in Volume Fifty-two

- | | |
|------------------------------------|-----------------------------------|
| Abalo, J. E., 387 | Moldenke, H. N., 18, 20, 45, 110, |
| Bedell, H. G., 179 | 129, 132, 178, 184, 230, 289, |
| Beetle, A. A., 11 | 309, 320, 323, 330, 414, 415, 452 |
| Brooks, R. E., 8 | Morales L., G., 387 |
| Burns-Balogh, P., 367 | Moran, R., 221 |
| But, P. P.-H., 257 | Osorio, H. S., 217 |
| Calderon de Rzedowski, G., 99 | Oswald, F. W., 93 |
| Chia, L.-C., 257 | Pringle, J. S., 285 |
| Crewz, D. W., 288 | Rabaler, R. K., 379 |
| Cuatrecasas, J., 157, 159, 166 | Read, R. W., 49 |
| D'Arcy, W. G., 9, 230 | Reveal, J. L., 179 |
| Foot, M. A., 1, 281 | St. John, H., 145 |
| Fung, H.-L., 257 | Scott, A. R., 331 |
| Gandhi, K. N., 352, 365, 376, 377 | Silba, J., 349 |
| Gómez P., L. D., 153, 227 | Smith, L. B., 49, 441 |
| Gómez-L., J., 227 | Thomas, R. D., 362, 365, 376, 377 |
| Grether, R., 81 | Turner, B. L., 252, 369, 491, |
| Hatherill, J. R., 75 | 493, 495 |
| Henry, R. D., 331, 336 | Volz, P. A., 75 |
| Hocking, G. M., 261 | Wasshausen, D. C., 95, 441 |
| Hutchison, P. C., 373 | Wurdack, J. J., 61 |
| Kress, A., 255 | Yatskievych, G., 73 |
| Moffler, M. D., 288 | |
| Moldenke, A. L., 70, 148, 212, 438 | |

- - - - -

Index to supra-specific scientific names in Volume Fifty-two

- | | |
|--|--|
| <u>Abelia</u> , 490 | <u>Actinomycetes</u> , 80 |
| <u>Abies</u> , 354, 356 | <u>Adenothamnus</u> , 224, 225 |
| <u>Abildgaardia</u> , 380 | <u>Aechmea</u> , 56 |
| <u>Abolbodaceae</u> , 181 | <u>Aegiphila</u> , 115, 116, 118-122, 127, |
| <u>Abrus</u> , 262 | 197, 230, 237-251, 289-309 |
| <u>Abutilon</u> , 338 | <u>Aegiphylle</u> , 237 |
| <u>Acacia</u> , 313, 314, 317, 319 | <u>Aegophila</u> , 237 |
| <u>Acalypha</u> , 342 | <u>Aegophylla</u> , 127, 237, 245, 298 |
| <u>Acanthaceae</u> , 95, 233, 234, 385 | <u>Aeschynomene</u> , 382 |
| <u>Acanthochiton</u> , 381 | <u>Aesculus</u> , 224, 383 |
| <u>Acantholippia</u> , 127 | <u>Agalinis</u> , 229, 385 |
| <u>Acer</u> , 339, 341, 383 | <u>Agapanthaceae</u> , 180, 181 |
| <u>Aceraceae</u> , 383 | <u>Agarista</u> , 384 |
| <u>Achillea</u> , 338, 385 | <u>Agastache</u> , 384 |
| <u>Acicarpa</u> , 385 | <u>Agavaceae</u> , 180, 181 |
| <u>Acoraceae</u> , 180, 181 | <u>Agave</u> , 319, 381 |
| <u>Acorus</u> , 342 | <u>Agrimonia</u> , 341 |
| <u>Actinomadura</u> , 263 | <u>Agrobacterium</u> , 483 |

- Agrostemma, 338
Agrostis, 11
Aizoaceae, 338
Ajugeae, 429
Alagoasa, 296
Alchemilla, 382
Aletris, 380
Algae, 1, 7, 281, 438
Algiphila, 237, 296, 303
Alismataceae, 180, 280
Alismatales, 180
Alismatanae, 180
Alistmataceae, 181
Alistmatales, 181
Alistmatanae, 181
Alliaceae, 180, 181
Allium, 380
Alloneuron, 61
Alnus, 381
Aloë, 53
Aloeaceae, 180, 181
Alophia, 381
Aloysia, 18, 114, 115, 121-123, 125
Alstroemeriaceae, 181
Alternanthera, 381
Amaranthaceae, 381
Amaranthus, 338-340, 342, 381
Amaryllidaceae, 180, 181, 381
Amasonia, 120-122
Amauropeltis, 155
Amazonia, 235
Amblyarrhena, 64-67
Ambrosia, 341, 342
Amelanchier, 382
Amethystea, 429-431, 453
Ammobroma, 74
Amphiachyris, 385
Amphicarpum, 380
Amphidinium, 1
Anagallis, 341
Anarthiaceae, 181
Anathraceae, 181
Andropogon, 11, 13, 14, 17
Androsace, 255, 256
Angiospermae, 276
Annonaceae, 382
Antheraceae, 181
Anthericaceae, 180
Anthidium, 431
Apacheria, 382
Apelta, 155
Aphylla, 367
Aphyllanthaceae, 180, 181
Apocynaceae, 362, 376, 384
Apocynum, 342
Apoidea, 150
Aponogetonaceae, 180, 181
Apostasiaceae, 181
Aquifoliaceae, 383
Aquifoliatae, 225
Araceae, 180, 181, 375, 380
Arales, 180, 181
Aranae, 180, 181
Arecaceae, 181
Arecales, 181
Arecanae, 181
Aristolochiaceae, 381
Armoracia, 382
Arnica, 385
Artemisia, 149, 190, 224, 339
Aruncus, 382
Asclepiadaceae, 362, 366, 376
Asclepias, 376
Ascomycetes, 70
Ascophyllum, 281
Asimina, 382
Asparagaceae, 180, 181
Asperococcus, 281
Asphedelaceae, 180, 181
Aspidosperma, 18
Asteliaceae, 180, 181
Aster, 338, 339
Asteraceae, 352, 372, 495
Astereae, 166, 177
Astilbe, 382
Astragalus, 382
Athyrium, 154
Atriplex, 381
Aureolaria, 385
Avicennia, 117, 118, 121, 125, 127
Axonopus, 235, 244, 294
Baccharis, 166, 168, 263, 385

- Bambusa, 257-259
Barbula, 415, 429
Bartlettia, 365
Bartonia, 384
Basidiomycetes, 70
Bauhinia, 382
Begonia, 375, 441, 443-451
Begoniaceae, 383, 442
Berberidaceae, 226
Berberis, 221-226
Berteroa, 338
Betula, 381
Betulaceae, 381
Bidens, 338, 339, 341
Bignoniaceae, 238, 293, 377, 385
Blakea, 61, 68, 69
Bombacaceae, 239, 383
Boraginaceae, 310, 321, 365, 376, 493, 494
Bouchea, 116, 117, 309-320
Bouteloua, 11, 12, 319, 380
Bouvardia, 319
Brachiaria, 12, 13
Brahea, 313
Brasenia, 338
Brassica, 332
Brassicaceae, 377
Brickellia, 252-254, 313
Bromelia, 54
Bromeliaceae, 49, 51, 53, 55, 57, 59, 60, 181, 373, 380
Bromeliales, 181
Bromeliana, 180, 181
Bromelioideae, 53, 56
Bromus, 340, 342
Brumanniales, 182
Buche, 311, 312, 315, 316, 318
Buckleya, 381
Buddleia, 432
Buddleja, 384
Bulbostylis, 235, 244, 294, 380
Burmanniaceae, 181
Burmanniales, 181
Bursera, 301
Burseraceae, 383
Butomaceae, 180, 182, 380
Butomus, 380
Byrsonima, 234, 247
Cabomba, 338, 342
Cabombaceae, 338
Cacaliopsis, 385
Cactaceae, 375, 384
Calamagrostis, 104, 109
Callicarpa, 112-114, 118, 124, 126, 127, 237, 294, 467
Callipeltis, 415, 416
Callisteja, 385
Calochortaceae, 180, 182
Calotropis, 376
Calycanthaceae, 382
Calycanthus, 382
Calyceraceae, 385
Calylophus, 384
Calystegia, 144, 384
Camassia, 380
Campanulaceae, 385
Campsis, 338, 341
Campynemataceae, 181, 182
Candida, 75-80
Cannabis, 338
Cannaceae, 181, 182
Capparidaceae, 382
Caprifoliaceae, 385
Capsella, 338
Caraxeron, 381
Cardamine, 382
Cardaria, 338
Carduus, 338, 342, 385
Carex, 144, 339, 380
Cariopteris, 415-416, 435
Carnegiea, 264
Caropteris, 416
Caryopteris, 416
Carramboa, 158
Carryopteris, 127, 416, 471
Cartonemataceae, 181, 182
Carya, 338, 339
Caryocaraceae, 140
Caryophyllaceae, 382
Caryopsis, 416, 471
Caryopsis, 127, 471
Caryopteris, 416
Caryopterideae, 428
Caryopterioideae, 428
Caryopteris, 114, 123, 124, 126-129, 415, 417, 419, 421, 423,

- Caryopteris [cont.], 425, 427-435, 452-455, 457-471, 473, 475, 477, 479-490
Caryopters, 416, 435
Caryopterys, 416
Caryoptis, 416
Caryoptueris, 416
Caryoteris, 416
Carypteris, 415, 416, 471
Caryptoris, 416
Casselia, 320-322
Cassia, 317, 382
Catalpa, 377
Catharanthus, 376
Catopsis, 53
Cattleya, 275
Ceanothus, 224
Cecropia, 157, 158
Celastraceae, 197
Celosia, 381
Celtis, 317
Genchrus, 338
Centaurea, 342
Centrolepidaceae, 181, 182
Cephalanthus, 338
Cephalotaxus, 263
Cerastium, 332
Ceratium, 1, 2
Ceratophyllaceae, 382
Ceratophyllum, 382
Ceratopteridaceae, 380
Ceratopteris, 380
Cercocarpus, 224
Cercospora, 431
Cestrum, 238, 304
Chamaecyparis, 351, 353, 360
Chamaesyce, 383
Chaptalia, 385
Chascanum, 312, 323-329
Chaschanum, 323
Chelone, 385
Chenopodiaceae, 381
Chenopodium, 331, 341, 342, 381
Chionophila, 385
Chloraeformis, 367
Chlorogalum, 380
Chordaria, 281
Chorispora, 332
Chorizanthe, 381
Chrysactinia, 385
Chrysanthemum, 340, 342
Chrysobalanus, 382
Chrysothamnus, 385
Cichorium, 338
Circaea, 384
Cirsium, 340, 385
Cistaceae, 383
Citarexylum, 127
Citharexylem, 127
Citharexylom, 127
Citharexylum, 114-116, 118, 121, 126, 127, 240
Cladium, 229
Clarkia, 384
Claytonia, 382
Clematis, 382
Clerodendron, 20, 24, 27, 28, 31, 34, 44, 128, 206, 209, 429, 435, 453, 454, 463, 464, 466, 467
Clerodendrum, 24, 31, 32, 117-120, 123-126, 128, 291, 330, 432, 435, 453, 464, 466, 482
Clerodondron, 128
Clidemia, 61
Clintonia, 430
Clusia, 53
Cneoridium, 224
Coccoloba, 381
Cochlodinium, 2
Cogniauxiocharis, 368
Colchicaceae, 180, 182
Colquhounia, 432
Comarostaphylos, 224
Commelinaceae, 181, 182, 369, 370, 380
Commelinales, 181, 182
Commelinanae, 181, 182
Compositae, 169, 177, 336, 338, 339, 345, 385
Condalia, 313
Congea, 45-48, 124, 126, 128
Conglea, 128
Conium, 338, 342
Connaraceae, 197
Gonostylidaceae, 181, 182

- Convallariaceae, 180, 182
Convolvulaceae, 295, 384
Convolvulus, 317, 338, 384
Corallophyllum, 73
Cordia, 180, 242
Cordylanthus, 385
Coreopsis, 224, 332, 386
Cornaceae, 384
Cornus, 384
Cornutia, 116-118, 120, 139, 230, 291
Corsiaceae, 181, 182
Corylus, 338
Costaceae, 181, 182
Crassulaceae, 382
Crataegus, 362-364
Crepis, 386
Crescentia, 317
Critonia, 491, 492, 496
Groomiaceae, 180, 182
Crossosomataceae, 382
Crotalaria, 382
Croton, 316, 383
Cruciferae, 339, 382
Cryptanthus, 56, 374
Cryptogramma, 380
Cucurbita, 342
Culcitioides, 160, 162
Cuphea, 317
Cupressaceae, 349
Cupressus, 349-361
Curatella, 235, 244, 294
Cuscuta, 339, 342
Cyanastraceae, 180, 182
Cyanobacteria, 438
Cyathea, 10
Cycadaceae, 380
Cyclanthaceae, 181, 182
Cyclanthales, 181, 182
Cycloloma, 338
Cymodoceaceae, 180, 182
Cynodon, 338
Cynoglossum, 376
Cyperaceae, 181, 182, 339, 380
Cyperales, 181, 182
Cyperus, 228, 229
Cypripediaceae, 181, 182
Cyrillaceae, 383
Cystodinium, 2
Dalbergia, 288, 382
Dalea, 382
Dasistoma, 385
Dasyilirion, 252, 319, 380
Dasypogonaceae, 180, 182
Deiregyne, 367
Delonix, 245
Delphinium, 8, 332, 335, 376
Denisia, 323
Dennstaedtia, 10
Denticulata, 176
Derris, 262
Desmarestia, 281
Desmodium, 382
Desmotrichum, 281
Dianellaceae, 180, 182
Dicraurus, 381
Dictyosiphon, 281
Didierea, 274
Diervilla, 385
Digitaria, 13, 340, 342
Dinoflagellates, 1
Dinophysis, 2
Dioscoreaceae, 180, 182
Dioscoreales, 180, 182
Diplacus, 224
Diplazium, 10
Diplostephium, 174, 176, 177
Doryanthaceae, 180, 182
Dracaenaceae, 180, 182
Dracocephalum, 338
Dudleya, 224
Duranta, 117-119, 121, 123, 124, 126, 128
Dyssodia, 386
Eccremocarpus, 377
Ecdeiocoleaceae, 181, 182
Echinochloa, 337
Echinocystis, 338
Ectocarpus, 281, 282
Egeria, 380
Eichornia, 344
Elachista, 282
Elaeagnus, 332
Elaeodendron, 197

- Eleocharis, 128
Elephantopus, 386
Eleusine, 338
Ellisia, 338
Elodea, 380
Elscholtzia, 490
Elsholtzia, 432
Emilia, 386
Enchilirion, 374
Encholirium, 54
Epilobium, 384
Equisetophyta, 338
Equisetum, 339
Eragrostis, 380
Erechtites, 386
Eremalche, 383
Ericaceae, 384
Erigeron, 338, 339, 342, 386
Eriocaulaceae, 181, 182, 380
Eriocaulales, 181, 182
Eriocaulon, 110-113, 120-125, 128
Eriogonum, 224, 381
Eriophora, 367
Eriophyllum, 224, 263
Eriospermaceae, 180, 182
Errazurizia, 382
Erysiphe, 72
Erythrina, 288, 316
Erythronium, 380
Erythrophleum, 270
Erythroxylaceae, 383
Erythroxylum, 383
Eschscholtzia, 382
Espeletia, 158, 159, 161, 166
Espeletiopsis, 158
Eucaryopteris, 430
Eupatorieae, 492, 495
Eupatorium, 339, 491, 492, 496
Euphorbia, 331, 341, 342, 383
Euphorbiaceae, 140, 383
Eustoma, 384
Euxylophora, 262
Evodia, 207
Exuviella, 2, 3
Fabaceae, 288, 365, 366
Fagaceae, 338, 339, 381
Fagaceae, 338, 339, 381
Fagopyrum, 381
Fagraea, 41
Faradaija, 27, 36, 128
Faraday, 36
Faradaya, 20-45, 125, 126, 128
Fauria, 384
Fernseea, 54
Festuca, 104, 109
Fimbristylis, 380
Flagellariaceae, 181, 182
Flaveria, 386
Flourensia, 319
Forestiera, 319, 384
Formicoidea, 150
Fosterella, 49, 50
Fouquieria, 319, 383
Fouquieriaceae, 383
Fraxinus, 338
Fucus, 282
Fuirena, 380
Fungi, 438
Funkiaceae, 180, 182
Galarhoeus, 383
Galinsoga, 338, 386
Galium, 385
Galphimia, 383
Galvezia, 224
Garrettia, 429
Garrya, 384
Gaylussacia, 384
Gayophytum, 384
Geitonoplesiaceae, 180, 182
Gelsemium, 384
Gentiana, 384
Gentianaceae, 384
Gentianella, 384
Gentianopsis, 384
Geosiridaceae, 180, 182
Gesneriaceae, 385
Ghinia, 117, 118, 311
Giffordia, 282
Gilliesiaceae, 180, 182
Gilmania, 381
Githopsis, 385
Glecoma, 338
Glenodinium, 3

- Gliricidia, 245
Glossocalyx, 207
Glossocarya, 128, 429, 432
Gmelina, 126
Gochnatia, 313, 386
Gomphrena, 381
Gonyaulax, 3
Gossypianthus, 381
Greigia, 54
Graffenrieda, 61
Gramineae, 338, 380
Grammitis, 154, 155
Gratiola, 385
Gravisia, 56
Grayia, 381
Greenella, 386
Guaiacum, 275
Guilleminea, 381
Gumira, 196
Gutierrezia, 386
Guzmania, 53, 56
Gymnodinium, 3, 4
Gynoxys, 159, 164, 166
Gynura, 386
Gypsophila, 382
Gyrodinium, 4, 5
Haemodoraceae, 181, 182, 381
Haemodorales, 181, 182
Haemodoranae, 180, 182
Halenia, 384
Haploesthes, 386
Haplopappus, 333
Halophilaceae, 180, 182
Halothrix, 282
Hamamelidaceae, 382
Hanguanaceae, 180, 182
Harperocallis, 380
Hecastocleis, 386
Hecatonema, 282
Hechtia, 319
Hedeoma, 384
Hedyotis, 385
Helenium, 386
Helianthus, 93, 341, 386
Heliconia, 375, 388-413
Heliconiaceae, 181, 182
Helietta, 313
Heliocarpus, 316
Heliotropium, 376
Hemerocallidaceae, 180, 182
Hemicarpha, 380
Hemiphora, 126
Herbertia, 381
Hermaphroditantha, 156
Herreriaceae, 180, 182
Hesperaloe, 380
Heterocapsa, 5
Heteromeles, 224
Heterothalamus, 168
Heterotheca, 333, 386
Hewardiaceae, 180, 182
Hippocastanaceae, 383
Hippocrateaceae, 293
Hirtella, 382
Hollisteria, 381
Holmskioldia, 118, 126
Hostaceae, 180, 182
Houstonia, 148, 385
Hudsonia, 383
Hyacinthaceae, 180, 182
Hydatellaceae, 181, 182
Hydatellales, 181, 182
Hydrangea, 485
Hydrocharitaceae, 180, 182, 380
Hydrocharitales, 180, 182
Hydrophyllaceae, 384
Hymenoptera, 150
Hymenopyramis, 429
Hypolytrum, 229
Hypoxidaceae, 180, 182
Hyptis, 384
Ilisia, 169
Ipomoea, 144, 317
Iresine, 381
Iridaceae, 180, 182, 381
Iris, 381
Isoetes, 153
Isophysidaceae, 180, 182
Isoptera, 150
Ixeris, 144
Ixioliriaceae, 180, 182
Jaltomata, 9, 10, 230
Jamesianthus, 386
Joinvilleaceae, 181
Joinvilleaceae, 182

- Juglandaceae, 339, 381
Juncaceae, 181, 182, 380
Juncaginaceae, 180, 182
Juncales, 181, 182
Juncus, 380
Junellia, 121, 123
Juniperus, 221, 352, 488
Justicia, 95-98
Kalmia, 384
Katodinium, 5
Keckiella, 385
Kelloggia, 385
Kigelia, 377
Koanophyllon, 495-498
Kochia, 338
Koeleria, 14
Krameria, 319
Kryptoperidinium, 5
Labiatae, 304, 314, 384
Labordia, 145-147
Lachnocaulon, 111, 112
Lachnostachys, 128
Lagenifera, 168-173, 177
Lagenophora, 169
Lamiaceae, 232, 238, 321, 362, 365, 376, 429, 431, 432, 452, 454, 490
Laminaria, 282
Lamium, 376
Lasariaceae, 180, 182
Lantana, 18, 111, 112, 114-123, 125, 126, 128-130, 178, 230, 231, 414
Lapageria, 275
Lappula, 333
Lardizabalaceae, 226
Lasiocephalus, 164
Leandra, 61
Leathesia, 282
Leguminosae, 81, 382
Leiostrix, 128
Leleba, 258, 259
Lemnaceae, 180, 182
Lennoa, 73, 74
Lennoaceae, 73
Lentibulariaceae, 385
Leonurus, 333
Lepidospartum, 386
Leptochloa, 14, 15
Lespedeza, 382
Leucas, 376
Leucophyllum, 319
Leucothoe, 384
Lewisia, 382
Libanothamnus, 158
Licania, 382
Ligustrina, 285, 286
Ligustrum, 285
Lilaeaceae, 180, 182
Liliaceae, 181, 182, 380
Liliales, 180, 182
Lilianaee, 180, 182
Lilidae, 180, 182
Liliopsida, 179, 338
Limnantha, 376
Limnanthaceae, 376, 383
Limnanthes, 383
Limnocharitaceae, 180, 182
Linaceae, 383
Linaria, 333
Linum, 341
Lippia, 19, 114-119, 121-123, 126, 128, 130, 414, 482
Liquidambar, 382, 497
Lithophila, 381
Lithospermum, 493, 494
Loasaceae, 383
Lobularia, 333
Loganiaceae, 41, 145, 384, 432
Lomatia, 128
Lomatogonium, 384
Lonchocarpus, 262
Lonicera, 341
Lophiola, 381
Lophiolaceae, 181, 182
Loranthaceae, 381
Lotus, 224
Lowiaceae, 181, 182
Luina, 386
Lupinus, 382
Luzula, 380
Luzuriagaceae, 180, 182
Lycium, 34
Lycopodium, 153, 374
Lycopus, 384
Lyonia, 384

- Lysimachia, 384
Lythraceae, 384
Maclura, 338, 341
Macranthera, 385
Macrothelypteris, 380
Magnolia, 382
Magnoliaceae, 376, 382
Magnoliophyta, 179, 338
Magnoliopsida, 338
Mahonia, 221, 222, 225, 226
Maieta, 68
Malosma, 224
Malpighia, 383
Malpighiaceae, 244, 247, 290, 383
Malvaceae, 383
Malvales, 365, 366
Malvastrum, 383
Manfreda, 381
Manihot, 383
Marantaceae, 181, 182
Margaritaria, 383
Marina, 382
Mariscus, 229
Marshalljohnstonia, 370, 372
Martyniaceae, 338
Mascagnia, 319
Mastacanthus, 415, 428-430, 453, 471
Matricaria, 342
Maurandia, 317
Mayacaceae, 181, 182
Melanthiaceae, 181, 182
Melanthium, 380
Melastomataceae, 61, 63, 65, 67, 69, 384
Melia, 383
Meliaceae, 383
Melochia, 383
Meloidogyne, 431, 483
Memecylon, 206
Menispermaceae, 226
Menyanthes, 384
Meriania, 61
Metasphaeria, 431
Michuacana, 367
Miconia, 61
Miconieae, 61-67
Microstegium, 380
Microtaena, 128, 435, 453
Millingtonia, 377
Mimosa, 81-87, 89-92, 303
Mimoseae, 92
Mimulus, 385
Miscanthus, 333
Mollicutes, 149
Mollugo, 338
Monocotyledonae, 180, 182
Monocotyledoneae, 180
Montia, 382
Morina, 312
Morus, 338
Mostuea, 291
Muhlenbergia, 104, 342, 380
Musaceae, 181, 182
Mycolastales, 149
Myrionema, 282
Myriotrichia, 282
Naias, 342
Najadaceae, 180, 182, 380
Najadales, 180, 182
Najas, 380
Narathura, 38
Narthecium, 381
Nasturtium, 382
Nelumbo, 339
Nelumbonaceae, 338
Nemacaulis, 381
Nemastylis, 381
Nematodinium, 5
Neolaugeria, 385
Neottia, 367
Nepeta, 339, 453, 471, 479, 489
Nepta, 416, 471
Nerisyrenia, 370
Nestronia, 381
Newcastelia, 126
Nicandra, 341
Nicolletia, 386
Nidularium, 56
Nissolia, 382
Noctiluca, 5
Nolina, 252, 381
Nolinaceae, 180, 182

- Nomimium, 99, 108
Nothochelone, 385
Nuphar, 339, 382
Nyctaginaceae, 382
Nymphaea, 339
Nymphaeaceae, 338, 382
Nymphoides, 384
Nyssa, 384
Oblea, 5
Obolaria, 384
Occidentales, 225
Ochnaceae, 383
Ocimum, 376
Octopleura, 67
Oenothera, 384
Oleaceae, 381
Oldenlandia, 385
Oleaceae, 285, 384
Oligandra, 156
Onagraceae, 384
Onopordum, 339
Orchidaceae, 181, 182, 365-367, 381
Orchidales, 181, 182
Orientales, 225
Orobanchaceae, 385
Orthocarpus, 385
Orthophytum, 373-375
Orthotanthus, 56
Ossaea, 61
Oxalidaceae, 383
Oxalis, 383
Oxytheca, 381
Paepalanthus, 19, 119-122, 128, 414
Palicourea, 303
Palmae, 181, 182, 380
Pandanaceae, 181, 182, 380
Pandanales, 181, 182
Panicum, 12, 13, 15
Papaver, 334, 382
Papaveraceae, 382
Paraguayenses, 368
Parasitica, 367
Paronychia, 382
Parthenium, 319, 386
Paspalum, 15, 16
Pastinaca, 339
Paulownia, 385
Pedicularis, 385
Pedilanthus, 383
Pelexia, 367, 368
Penstemon, 104, 385
Pentacalia, 159, 163, 164, 166
Pentodon, 385
Peridiniopsis, 5
Peridinium, 5, 6
Peridinopsis, 6
Perityle, 386
Peronema, 429
Petalonia, 383
Petasites, 386
Petermanniaceae, 180, 182
Peteravenia, 492
Petitia, 118
Petrea, 116, 118, 120-122, 126
Petrophyton, 382
Petrorhagia, 382
Petrosaviaceae, 181, 182
Petunia, 334
Peucephyllum, 386
Phaeophyta, 281
Phasianurus, 430
Philesiaceae, 180, 182, 275
Philodice, 122
Philoxerus, 381
Philydraceae, 181, 182
Philydrales, 181, 183
Phlomis, 384
Pholisma, 73, 74
Phormiaceae, 180, 182
Phryma, 325
Phyla, 112-119, 121, 127, 128
Phylla, 128
Phyllanthus, 263, 383
Phyllitis, 283
Physalis, 334, 339, 341, 342
Physostegia, 384
Phytolacca, 339, 382
Phytolaccaceae, 338, 382
Pieris, 384
Pinophyta, 338
Pinus, 103-105, 108, 109, 221, 224, 225, 338, 339, 341, 355, 356

- Pistiacae, 180, 183
Pitcairnia, 50, 51, 55, 57, 58
Pitcairnioideae, 49, 54
Pityrodia, 125
Platanus, 221
Platyopuntia, 319
Plectranthus, 432, 454
Pleea, 381
Plumeria, 376
Poa, 17, 342
Poaceae, 181, 183, 338, 339, 345
Poales, 181, 183
Podocarpus, 53
Pogostemon, 432
Polemoniaceae, 384
Polianthes, 381
Poliomnitha, 385
Polycarpon, 229
Polygalaceae, 383
Polygonaceae, 338, 339, 381
Polygonella, 381
Polygonum, 338-340, 381
Polykritos, 6
Polymnia, 341
Polypodiaceae, 380
Polypodiophyta, 338
Pomoideae, 362
Pontederanae, 180, 183
Pontederia, 380
Pontederiaceae, 181, 183, 380
Pontederiales, 181, 183
Populus, 338, 339, 341, 381
Porophyllum, 386
Portulacaceae, 382
Posidoniaceae, 180, 183
Potamogeton, 338, 339, 342, 343, 380
Potamogetonaceae, 180, 183, 380
Potamogetonales, 180, 183
Potosia, 367
Premna, 123-125, 127, 186, 196, 197
Primulaceae, 384
Priva, 116-118
Proboscidea, 339
Prorocentrum, 6
Prosopis, 382
Protea, 325
Protoceratium, 6
Protoliriaceae, 181, 183
Prunella, 339
Prunus, 338, 339, 341
Psathyrotes, 386
Pseudaechmea, 53, 54, 59, 60
Pseudobaccharis, 168
Pseudobombax, 301
Pseudocaryopteris, 416, 428, 430
Pseudomyriactis, 108, 169, 173
Pseudophegopteris, 380
Pseudopilosocereus, 374
Psila, 168
Psilocarya, 380
Psorothamnus, 382
Pterichis, 228
Pteridium, 339
Pteridophyta, 380
Pterostegia, 381
Punctaria, 283
Punica, 362-364
Punicaceae, 362
Puya, 49
Pylaiella, 283
Pyramidales, 367
Pyrrhophyta, 1, 7
Pyrularia, 381
Quararibea, 239
Quercus, 252, 288, 313, 317, 338, 339, 381
Rabdolia, 145, 146
Radiati, 160
Rafflesia, 264
Ralfsia, 283
Ranunculaceae, 335, 376, 382
Ranunculus, 382
Rapateaceae, 181, 183
Remirea, 229
Restionaceae, 181, 183
Restionales, 181, 183
Rhamnaceae, 383
Rhamnus, 224, 354
Rhexia, 384
Rhizobium, 212
Rhododendron, 384
Rhododon, 385

- Rhus, 8, 224, 319, 339
Rhynchospora, 380
Ribes, 224, 225
Richardia, 385
Ripogonaceae, 180, 183
Rorippa, 344, 382
Rosa, 221, 224, 277, 341, 342
Rosaceae, 338, 339, 345, 362, 376, 382
Rourea, 197
Roxburghiaceae, 180, 183
Rubiaceae, 207, 289, 291, 301, 385
Rubus, 338, 339, 382
Rudbeckia, 148
Rumex, 335
Rupestria, 177
Ruppiaceae, 180, 183
Ruscaceae, 180, 183
Rutaceae, 383
Sabal, 288
Sabatia, 384
Sabina, 480
Sagina, 382
Sagittaria, 380
Salicaceae, 339, 381
Salix, 338, 339, 341, 381
Salvia, 224, 225
Santalaceae, 381
Sanvitalia, 317
Sapindaceae, 383
Sapotaceae, 384
Sarcoglottis, 367
Sargassum, 283
Saxifraga, 382
Saxifragaceae, 382
Scheuchzeriaceae, 180, 183
Schiedeanae, 225
Schiedeella, 367
Schinopsis, 18
Schizachyrium, 11
Schlegelia, 238
Schmaltzia, 8
Sciaphila, 156
Scillaceae, 180, 183
Scirpus, 339, 380
Scrophulariaceae, 339
Scytosiphon, 283
Scytosiphonia, 283
Sedum, 382
Selaginella, 153, 154
Senecio, 159-162, 164, 386
Senecioneae, 159, 161, 163, 165
Sensitivae, 81
Serapias, 368
Setaria, 342
Sicyos, 339
Sijymphorema, 129
Silene, 382
Silphium, 386
Simmondsia, 224
Sisyrinchium, 381
Smilacaceae, 180
Smilacales, 180, 183
Smilaceae, 183
Smilax, 381
Sodirola, 53
Solanaceae, 9, 236, 247, 298, 301, 385
Solanum, 341, 342
Solidago, 338, 339
Sonchus, 339
Sorghastrum, 17
Sorghum, 337, 341
Sparganiaceae, 181, 183, 380
Sparganium, 380
Specularia, 334
Sphacelaria, 283
Sphaeralcea, 383
Sphaerometopa, 29
Sphaerophysa, 382
Sphaerotrachia, 283
Spilanthes, 386
Spiraea, 382
Spiranthes, 367, 368, 381
Spiranthinae, 367, 368
Stachydeoma, 385
Stachys, 385
Stachytarphaeta, 316
Stachytarpheta, 116-122, 124, 127, 131, 231, 313, 314, 324, 414, 415
Staphyleaceae, 383
Stemonaceae, 180, 183

- Stenocereus, 311
Stenomeridaceae, 180, 183
Sterculiaceae, 383
Stilophora, 283
Stipa, 380
Stokesia, 386
Strelitziaceae, 180, 183
Streptomyces, 263
Struthiola, 324
Stylodon, 111, 112
Swallenia, 380
Swertia, 384
Symbolanthus, 129
Symphorema, 129
Symphoricarpos, 339
Symplocaceae, 384
Symplocos, 384
Syngonanthus, 19, 111, 112, 119-122, 127-129, 131, 231, 232
Syringa, 285, 286
Taccaceae, 180, 183
Taccales, 180, 183
Taccanae, 180, 183
Tagetes, 386
Taligalia, 232
Tamaricaceae, 383
Tamarix, 383
Tanacetum, 342
Taraxacum, 339
Taxus, 263
Tecophilaceaceae, 183
Tecophilaeaceae, 180
Tectaria, 10
Tectona, 127, 129
Teijsmanniodendron, 198, 203
Tephrosia, 262
Terminalioides, 129
Tetradymia, 386
Tetrathyranthus, 24
Teucrium, 339, 342, 432
Thalassiaceae, 180, 183
Theaceae, 383
Thelypteris, 155, 156, 380
Thismiaceae, 181, 183
Thlaspi, 382
Thurniaceae, 181, 183
Thurovia, 386
Tidestromia, 381
Tillandsia, 52, 55
Tillandsioideae, 52, 55
Tiquilia, 319
Tococa, 67, 68
Tofieldia, 381
Tomanthera, 385
Tonina, 121, 129
Topobea, 61, 69
Tournefortia, 190
Toxicodendron, 341
Tradescantia, 369-372
Tragopogon, 341, 342
Trichanchne, 14
Trichopodaceae, 180, 183
Tricyridaceae, 181, 183
Trifolium, 383
Trifurcia, 381
Trilliaceae, 180, 183
Trillium, 381
Tripterygium, 263
Triuridaceae, 156, 180, 183
Triuridales, 180, 183
Triuridanae, 180, 183
Trixis, 386
Tuberosae, 370
Turneraceae, 383
Typha, 339, 380
Typhaceae, 181, 183, 338, 380
Typhales, 181, 183
Typhanae, 180
Ulmaceae, 339
Ulmus, 339
Umbelliferae, 384
Urticaceae, 381
Usnea, 217-220
Utricularia, 342
Vaccinium, 384
Valeriaceae, 385
Valeriana, 385
Valerianella, 385
Vallesia, 384
Vallisneria, 380
Vallisneriaceae, 180, 183
Vellozia, 374
Velloziaceae, 181, 183, 375
Velloziales, 181, 183
Venegasia, 224

Verbena, 110-119, 121-124,
 127, 129, 232, 316, 330,
 384, 481, 482
Verbenaceae, 20, 365, 384,
 429, 431, 432, 481
Vernonia, 334, 386
Veronica, 338, 339, 482
Vespoidea, 150
Viturnum, 334, 385
Viguiera, 319, 380
Viola, 99-106, 108, 383
Violaceae, 99, 383
Virginianae, 370
Viscum, 53
Vismia, 303
Vitaceae, 132
Vitex, 19, 120-125, 127, 129,
 132-141, 143, 144, 184-189,
 191-211, 463, 464, 466
Viticeae, 429
Viticipremna, 196
Vitis, 464
Volkameria, 463, 454, 466,
 467
Vriesea, 52, 56
Walleriaceae, 180, 183

Websteria, 380
Westoniella, 169, 173, 174, 177
Whitfordiodendron, 206
Xanthium, 341
Xanthocephalum, 386
Xanthorrhoeaceae, 180, 183
Xanthosoma, 227
Ximenia, 381
Xolocotzia, 116, 117
Xylococcus, 221, 224
Xyridaceae, 181, 183, 380
Yucca, 319, 381
Zamia, 380
Zanichellia, 339
Zanichelliaceae, 180, 183, 338
Zephyranthes, 381
Zingiberaceae, 181, 183
Zingiberales, 181, 183, 366
Zingiberanae, 181, 183
Zornia, 383
Zostera, 282
Zosteraceae, 380, 383
Zosteriales, 180, 383
Zosterella, 339
Zuckia, 381
Zygophyllaceae, 383

Publication dates

Volume 51, Number 6 — August 16, 1982
 Volume 51, Number 7 — September 7, 1982
 Volume 52, Number 1 — September 17, 1982
 Volume 52, Number 2 — October 13, 1982
 Volume 52, Number 3 — October 31, 1982
 Volume 52, Number 4 — December 10, 1982
 Volume 52, Number 5 — February 17, 1983



New York Botanical Garden Library



3 5185 00217 0064



NOV 83

N. MANCHESTER.

